Final Report

THE IMPACT OF STRUCTURED HEALTHY LIFE-STYLE PROGRAM AMONG TYPE 2 DIABETIC PATIENTS IN KELANTAN.

BY

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UNIVERSITI SAINS MALAYSIA

NOVEMBER 2001

UNIVERSITI SAINS MALAYSIA
DITERIMA
17 OCT 2001
Bahagian R & D
Pusat Pengajian Sains Perubatan

ABBREVIATIONS

BMI	Body mass index
CAD	Coronary artery disease
CVD	Cardiovascular disease
CI	Confidence interval
DCCT	Diabetes Control and Complication Trial
FFA	Free fatty acid
GLM	General Linear Models
GP	General Practitioner
HC	Health center
HDL	High density lipoprotein
HLA	Human leucocyte antigen
IDDM	Insulin dependent (Type 1) diabetes mellitus
IHD	Ischemic heart disease
LDL	Low density lipoprotein
MI	Myocardial infarction
MODY	Maturity Onset Diabetes of the Young
NIDDM	Non-insulin dependent (Type 2) diabetes mellitus
SD	Standard deviation
SPSS	Statistical Package for Social Science.
UKPDS	United Kingdom Prospective Diabetes Study
WHO	World Health Organization

Semua laporan kemajuan dan laporan akhir yang dikemukakan kepada Bahagian Penyelidikan dan Pembangunan perlu terlebih dahulu disampaikan untuk penelitian dan perakuan Jawatankuasa Penyelidikan di Pusat Pengajian.

USM JP-06

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UNIVERSITI SAINS MALAYSIA

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2) **Pusat Pengajian/Pusat/Unit:** Pusat Pengajian Sains Perubatan

3) **Tajuk Projek:** The Impact of Structured Healthy Lifestyle Program Among Type 2 Diabetic Patients in Kelantan

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4. (a) **Penemuan Projek/Abstrak**

(Perlu disediakan makluman diantara 100-200 perkataan di dalam Bahasa Malaysia dan Bahasa Inggeris, ini kemudiannya akan dimuatkan ke dalam Laporan Tahunan Bahagian Penyelidikan & Pembangunan sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti.)

ABSTRAK.

Satu kajian kawalan tidak rawak telah dilakukan dengan tujuan untuk mengkaji keberkesanan program cara hidup sihat yang tersusun di kalangan pesakit diabetes jenis 2 di Kelantan. Seratus empat puluh pesakit diabetes jenis 2 dari Klinik Kesihatan Selising dan Gaal Pasir Puteh telah dipilih melalui kaedah persampelan berperingkat. Kumpulan kajian telah diberikan pendidikan kesihatan mengenai penjagaan diabetes, pemakanan dan senaman. Kumpulan kawalan pula telah diberikan pendidikan kesihatan oleh kakitangan klinik seperti biasa. Data-data telah dikumpul dengan menggunakan borang soal-selidik, pengukuran antropometri dan pengambilan sampel darah untuk HbA1c dan paras glukos. Analisa data dilakukan dengan menggunakan program "Statictical Package for Social Science". Pesakit dari kedua-dua klinik kesihatan mempunyai taburan sosio-demografi yang sama ($p>0.05$). Kebanyakan mereka adalah Melayu (99%), perempuan (59% kajian : 66% kawalan), berkahwin (74% kajian : 86% kawalan) dan tidak merokok (67% kajian : 73% kawalan). Purata (SD) umur adalah 56.0 (10.17) tahun bagi kumpulan kajian dan 54.2 (11.75) tahun bagi kumpulan kawalan. Kumpulan kajian menunjukkan peningkatan yang bermakna ($p<0.05$) dalam purata pengetahuan (16.5(sebelum) : 23.8(selepas)), purata amalan (14.5 : 15.6), purata HbA1c

(10.3 : 8.9)% dan purata BMI (26.1 : 25.8) kgm^{-2} selepas program intervensi, manakala tiada perbezaan yang bermakna berlaku di dalam kumpukan kawalan ($p>0.05$). Kajian ini menunjukkan bahawa paras kawalan glukos dan BMI pesakit diabetes jenis 2 dapat ditingkatkan sekiranya mereka bersedia untuk mengubah cara hidup mereka. Tetapi masalah yang lebih besar adalah untuk memastikan berapa lama mereka akan terus mengekalkan cara hidup sihat ini.

ABSTRACT.

A non-randomised control trial was conducted with the aim to assess the impact of structured healthy life-style program among Type 2 diabetic patients in Kelantan. One hundred and forty Type 2 diabetic patients from Selising Health Centre (intervention group) and Gaal Health Centre (control group) in Pasir Puteh District were selected using multistage sampling technique. An intervention group was given a structured health education on self-care, dietary advise and exercise. The control group was given conventional health education. Data were collected using a structured questionnaire, anthropometrics measurement and blood sampling for random blood sugar and HbA1c. Statistical Package for Social Science (SPSS) version 9.0 was used for analysing the data. The patients in both health centres had a similar sociodemographic distribution (p value > 0.05). Most of them are Malay (99%), females (59 % intervention, 66 % control), married (74 % intervention, 86 % control), and a non-smoker (67 % intervention, 73 % control). Their mean (+ SD)

age was 56.0 + 10.17 year (intervention) vs 54.2 + 11.75 year (control) and mean (SD) duration of diabetes was 5.6 (4.81) year (intervention) vs. 5.4 (4.23) year (control). The intervention group showed a significant improvement in mean score of knowledge (16.5 (4.49) vs 23.8 (1.42)), practice (14.5(2.13) vs. 15.6 (2.42)), HbA1c (10.3(2.85) vs 8.9(1.93)) and BMI level (26.1(4.08) vs 25.8(3.98)) kgm^{-2} after the intervention program whereas no significant different seen in the control group. The study showed that the blood glucose control and BMI of Type 2 diabetic patients could be improved if they are willing to change their lifestyle. The main challenge in management of these patients is however to sustained their healthy lifestyle.

(b) **Senaraikan Kata Kunci yang digunakan di dalam abstrak:**

Bahasa Malaysia	**Bahasa Inggeris**
Diabetes jenis 2	Type 2 diabetes
Carahidup sihat	Healthy lifestyle
Paras HbA1c	HbA1c level
Indeks jisim badan	Body mass index
Pengetahuan, sikap dan amalan	Knowledge, attitude and practice

5. **Output Dan Faedah Projek**

(a) **Penerbitan** (*termasuk laporan/kertas seminar*)
(*Sila nyatakan jenis, tajuk, pengarang, tahun terbitan dan di mana telah diterbitkan/dibentangkan*)

1. **' Glycaemic control among type 2 diabetic patients in Kelantan'**

   Pembentang : Dr. Ab. Aziz al-Safi bin Ismail

   Kolokium Kesihatan Masyarakat Ke 7 di UKM Cheras

   Pada : 2 -3 Oktober 2000

2. **' Obesity among type 2 diabetic patients in Kelantan'**

   Pembentang : Dr. Suhaiza bt. Sulaiman

   Kolokium Kesihatan Masyarakat Ke 7 di UKM Cheras

   Pada : 2 -3 Oktober 2000

3. **' The impact of structured healthy lifestyle program among type 2 diabetic patients in Kelantan'**

   Pembentang: Dr. Suhaiza bt. Sulaiman

   '1st. ASEAN Conference on Medical Sciences' di Kota Bharu Kelantan

Pada: 18 - 21 Mei 2001.

4. **' Increased in CVD risk in post-menopausal type 2 diabetic women in Kelantan'**

Pembentang: Dr. Ab. Aziz al-safi Ismail

'1st. ASEAN Conference on Medical Sciences' di Kota Bharu Kelantan

Pada: 18 - 21 Mei 2001.

(b) Faedah-Faedah Lain Seperti Perkembangan Produk, Prospek Komersialisasi Dan Pendaftaran Paten
(Jika ada dan jika perlu, sila gunakan kertas berasingan)

Tiada

(c) Latihan Gunatenaga Manusia

i) Pelajar Siswazah:

Dr Suhaiza Sulaiman, tahun 4
Sarjana Perubatan Masyarakat.

ii) Pelajar Prasiswazah:

iii) ***Lain-lain***

6. Peralatan Yang Telah Dibeli:

Tiada

UNTUK KEGUNAAN JAWATANKUASA PENYELIDIKAN UNIVERSITI

TANDATANGAN PENGERUSI
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TABLE OF CONTENT

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1. INTRODUCTION

1.1. Why diabetes?

Diabetes mellitus is a particular emerging health problem worldwide. The prevalence varies widely in different region, but observation showed a significant increased in prevalence of this chronic disease. In Malaysia, the prevalence in 1996 was about 8.3% (Ministry of Health Malaysia, 1997), increased from 0.65% in 1960 and 2.1% in 1982 (Mustaffa BE, 1990). Similar trends were observed in developed countries such as United States. The prevalence for United States was about 0.4% in 1930, increased to 2.4% in 1978 and 3.1% in 1994 (Satcher D, 1999). Between 1980 and 1994, the number of person with diagnosed diabetes in United States increased by 2.2 million, an increase of 39% (Satcher D, 1999). The increased prevalence probably related to increased of ageing population, lifestyle and dietary changes and improvement of diagnostic test.

Diabetes is the seventh leading cause of death in the United States, and contributes to more than 193,000 deaths each year (Satcher D., 1999). Currently an estimated 10.3 million people in United States have diagnosed with diabetes and another 5.4 million have undiagnosed diabetes (Satcher D., 1999). These people are all at increased for serious complications including:

In Malaysia, the prevalence of chronic complications is high, retinopathy is 53%, neuropathy is 58%, amputations is 2 %, legal blindness is 1%, myocardial infarction is 9%, stroke is 6% and renal failure 1% (Mustaffa BE, 1998).

Exercise is important for diabetics as it helps to reduce blood sugar level by increasing peripheral uptake and utilization of glucose. Exercise may help increase HDL-cholesterol and the feeling of well-being, exercise also will improve cardiovascular fitness of patients. It is important however, to stress that exercise should recommended only after an assessment of patient's cardiovascular status and metabolic control. It is prudent to advise diabetic to exercise in stages taking into account the patient's age, physical fitness, type of therapy and the cardiovascular status.

1.2 The Quality of Diabetes Care

The study by Peter et al. on the quality of diabetes care provided to patient in a large health maintenance organization in California (Jan 1993 –Jan 1994) had concluded that, in spite of the frequency of primary care physician visits during the year for many of these patients, diabetes management was inadequate (Peters AL et al., 1996). This lack of adequate preventive care will lead to an increased risk of the development of the acute or chronic complications of diabetes, creating an even greater future burden on the health care system and negative consequences for the patients.

A study on the quality of diabetes care between diabetic clinic and general medical clinic in West Los Angeles VA Medical Centre had conclude that, the patients cared by physicians in diabetes clinic received better quality of diabetes care than do patients cared by physician in general medical clinic (Ho M. et al., 1997). If patients cared is to be shifted from specialist to generalist, additional attention need to be paid to

ensure that the generalist has a knowledge and system resource necessary to deliver an acceptable quality of diabetes care.

In Malaysia, an audit on diabetes care was done in a hospital to assess the effectiveness of the diabetes management (Lim TO, 1990). Results revealed that diabetes patient received less than adequate care. Only 9% of patient achieved good glycaemic control; 39% had hypertriglyceridaemia and 65% had undesirable weight gain while on treatment.

An audit on adequacy of diabetes management in five Perak outpatient departments was done in April 1996 (Chan SC et al., 1997). Two hundred diabetic patient's records were analysed. All doctors and 100 patients answered the questionnaires on diabetes. Fifty five percent of doctors have adequate knowledge. Patient's knowledge varied between centres (13% - 80% adequacies). Overall control and monitoring of diabetes were inadequate. Referrals for complications were delayed in two centres. Refresher course for doctors, patient's health education, protocols, screeners and physician visit are recommended.

As a conclusion, most of the previous study showed the diabetes care is still inadequate. This condition was reflex by the high percentage of patients with poor glycaemic control and poor knowledge on diabetes. The lack of care will lead to an increased risk of the development of the acute and chronic complications of diabetes, creating an even greater future burden on the health care system and negative

consequences for the patients. However not much of the study had high light the way how to overcome this problems.

The role of primary care doctors includes curative as well as preventive or promotive health care. Thus it includes caunselling of the diabetes patients regarding the natural history the disease. To be able to give a proper and good advice and counseling it is necessary that one should have deep understanding on the knowledge, attitude and practice among diabetes patients.

This study is undertaken with the aim to assess the status of knowledge, attitude and practice of the diabetic patients. Then we are trying to provide the structured healthy life-style program for the patients. This structured healthy life style program will cover three major aspect of diabetes management (diet, exercise, and health education). The glucose and HbA1c level will be measured before and after the intervention program.

It is hoped that the experienced gained from the research and writing of the dissertation helps both the author and the patients in the management of diabetes.

1.3 Background of the study area.

Kelantan is situated on east coast of Peninsular Malaysia with Thailand (Pattani) at the north-east, Perak at the west, Pahang at the south and Terengganu at the east. The estimated population for 1998 was 1,484,000 with the growing rates of 2.55 (Hassan H,

1999). Majority of the population are Malays (94.1%), follow by Chinese (4.6%) and Indians (0.5%). Kelantan is a unique state with tis own sociocultural background, type of language and special traditional environment which was differ from other state in Malaysia. It is divide into 10 administrative districts that are Kota Bharu, Pasir Mas, Tumpat, Bachok, Pasir Puteh, Machang, Tanah Merah, Jeli, Kuala Krai and Gua Musang. In this study, Pasir Puteh was selected using a simple random sampling method. Pasir Puteh district is located at the south-east of Kelantan which was bordered by Kota Bharu district, Machang district, Bachok district and Terengganu state. The Pasir Puteh town is about 40 kilometres from Kota Bharu. The estimated population of Pasir Puteh in year 2000 was 137,718 (Yearly Report Pasir Puteh Health Office 2000). Majority of the population work as farmer, fisherman and rubber tapper with small percentage of the government staff. The hospital services are provided by Hospital Tengku Anis which is located in the town of Pasir Puteh. There are 10 general practioners with 8 of them in the town, one each in Cherang Ruku and Selising. The government primary health care are delivered through five health center(HC) that are located in Selising, Gaal, Cherang Ruku, Jeram and Pasir Puteh town. Two of the health center that are Selising HC and Gaal HC was randomly selected into the study.

Diabetes is one of the most prevalent chronic disease in Kelantan. At the primary care level (health center), diabetic patients are seen by medical assistant with occasionally reffered to the medical officer when they have a problems and at the secondary level (district hospital), the patients are seen by a medical officer. Previously the record are kept in a simple outpatients card and there are various degree of

completeness and quality of records, since there is no standard format. Now, the new format of recording the diabetics data was introduce by Malaysia Ministry of Health and it was more comprehensive and complete. Screening of the complications was rarely done unless the patients complaints about it. The monitoring of diabetes mainly done by RBS. The HbA1c test was only available at Hospital Kota Bharu (HKB). All the specimen for HbA1c collected in this district must be sent to HKB and the results will come back after two weeks. There was no dieticient posted at the district level.

This study mainly targeting the diabetic patients at the primary care level, in order to assess their level of glycaemic control, knowledge, attitude and practice on healthy life-style. We also trying to provide a structured education program for them during the intervention program. The assessment of HbA1c level, BMI, RBS and score of knowledge, attitude and practice was done before and after the intervention program in order to assess the effectiveness of the program.

2. OBJECTIVES:

2.1 General Objective:

To provide a structured healthy life-style program for type 2 diabetic patients in Kelantan.

2.2 Specific Objectives:

1. To describe the sociodemographic distribution of the type 2 diabetic patients in Kelantan.

2. To determine the level of knowledge, attitude and practice on healthy life-style among type 2 diabetic patients in Kelantan.

3. To evaluate the diabetic control among type 2 diabetic patients based on random blood sugar (RBS), glycosylated haemoglobin (HbA1c) and body mass index (BMI).

4. To assess the effectiveness of structured healthy life-style program on:

    i. knowledge, attitude and practice oo the patients.

    ii. diabetic control of the patients (RBS, HbA1c, BMI).

3. MATERIALS AND METHODS:

3.1. Research design.

A non-randomized control trial on type 2 diabetic patients was conducted from 1st. July 2000 till 30th. March 2001.

3.2. Study population.

All diabetic patients who had attending Selising Health Center & Gaal Health Center in Pasir Puteh, Kelantan and fulfill the inclusion and exclusion criterias during the period of study were selected into the study.

3.3. Sample size.

Sample size was determine using the formula of two proportion, based on the confidence interval of 95 %, power of the study 90 %, proportion of the success in previous study was 10.29 % (Bloomgarden et al., 1987) and expected proportion of success in this study was 40 %.

The formula was :

$$N = \frac{P_1(1-P_1)+P_2(1-P_2)}{(P_1-P_2)^2}\ (Z_\alpha + Z_\beta)^2$$

P_1 (Proportion of success in the control group) = 10.29 %

P_2 (Expected of success in the intervention group) = 40 %

Z_α (Confidence interval of 95 %) = 1.96

Z_α (power of the study 90 %) = 1.28

$$N = \frac{0.1\,(1-0.1) + 0.4\,(1-0.4)\,(1.96+1.28)^2}{(0.1-0.4)^2}$$

= 39 patients

Analyzed sample size = 70 patients for each group (intervention and control group) with the consideration of 60 % response rate.

3.4. Sampling technique.

3.4.1. Multistage sampling technique.

Pasir Puteh district was simply randomized from 10 districts in Kelantan (Kota Bharu, Pasir Mas, Tumpat, Pasir Puteh, Tanah Merah, Jeli, Machang, Kuala Krai, Gua Musang and Bachok). There are 5 health center (HC) in Pasir Puteh district : Pasir Puteh HC, Jeram HC, Gaal HC, Cherang Ruku HC and Selising HC. Selising and Gaal Health Centers were selected by simple random sampling technique. Between the two health, they were randomized into the intervention and control group.

3.4.2. Inclusion criteria.

i. All type 2 diabetic patients, diagnosed using the criteria set-up by World Health Organization, regardless the type of treatment.

ii. Aged more than 30 years (Chan SC, 1997)

iii. Patients must give a consent.

3.4.3. Exclusion criteria.

i. Patients with renal failure on dialysis.

ii. Patients with liver failure due to alcohol abuse, hepatitis and cirrhosis.

iii. Patients with history of acute illness and admission one month prior to the study period.

iv. Patients with other chronic disease such as Tuberculosis and cancer.

v. Condition associated with proteinuria such as urinary tract infection and on drug therapy like gentamycin, tetracycline, cisplatin, penicillamine and lithium.

vi. Patient who seek treatment in both health center

3.4.4. Definition :

Type 1 diabetes

All diabetic patient who was diagnosed using the WHO criteria and was treated with insulin since the time of diagnosis and was diagnosed before the aged of 30 year old.

Type 2 diabetes

All diabetic patient who was diagnosed using the WHO criteria, was not treated with insulin at the time of diagnosis and was diagnosed after the age of 30 year old.

3.5. Method of Data Collection.

Patients were individually interviewed using structured questionnaire (Appendix 1 & 2) about their sociodemographic data, medical history, knowledge, attitude and practice on healthy life-style. Patients gave signed consent after the study being explained by the researcher. Body weight and height were taken and the subjects were weighted barefooted and with light clothing on. The venous blood was taken using the aseptic technique. The blood was analyzed in Hospital Universiti Sains Malaysia biochemistry and endocrine laboratory. Random blood sugar was analyzed with the enzymatic glucose oxidase (GOD) method (Boehringer Mannheim, 1993) and HbA1c using the IMx cation exchange method (BIO-RAD, 1998). The intervention group

(Selising Health Center) was given a structured healthy life-style program and the control group (Gaal Health Center) was given a conventional education by their own staff. After the intervention program, the patients were interviewed again using the same structured questionnaire and venous blood was taken.

3.6. The Intervention Program.

The intervention program was consist of :

Health education

Dietary advised

Exercise program

It was lasted for six months.

3.6.1. Health Education.

The health education will focus on healthy life style and self-care on diabetes. The aim of health education is to increase the knowledge among diabetic patients regarding the natural history, prevention and control of diabetes mellitus. A focus group discussion and health seminar were choosed as a method of health education. The group will consist of one facilitator and 10-15 patients. For the healthy life style and diabetic care discussion, the facilitator was the medical officer and the diabetic seminar was given by the epidemiologist who was specialised in chronic diseases. The discussion was based on :

- The type of diabetes

- The risk factors of diabetes
- The causes of diabetes
- The management of diabetes
- The self-care of diabetes
- The complications of uncontrolled diabetes

3.6.2. Dietary advised.

The dietary advice was given by the dietician from Hospital Universiti Sains Malaysia. Two session of seminar were deliver to the patients in September and December 2000. The patients were explained regarding:

- What are the healthy and balance diet
- How to prepare the healthy and balance diet
- What are diabetic diet and the proportion of diet.
- The importance of well control diabetic diet.

3.6.3. Exercise Program.

The aim of exercise program is to introduce the type of exercise that appropriate for diabetic patient and can be done at home regularly without any expensive apparatus. The exercise was explained based on their daily basis activity, with just a little modification.

Before the exercise program started, the information was given regarding:

3.6.3.1. The benefits of exercise which include:

- Reducing insulin resistance
- Controlling of blood glucose level
- Achieve and maintain a healthy weight
- Positive psychological effect
- Prevent osteoporosis
- Less risk of cardiovascular disease

3.6.3.2. The signs of hypoglycaemia

The patient need to remember that a strenuous exercise can cause dangerously low blood glucose and they should carry a food or drink high in sugar for medical emergency. They should be aware of warning signs which may include some of the following:

- Hunger
- Nervousness
- Weakness
- Sweating
- Headache
- Blurred vision

- Confusion.

3.6.3.3. The type of exercise

Patient of all ages can benefit from increasing their level of activity. They don't have to go to the gym to 'work out' every day, little changes in their daily habits can make all the difference. For example they might:

- Choose to take stairs rather than the lift
- Park their car five minutes walk away from their destination, rather than as close as possible
- Get of the bus a stop earlier
- Spent an extra time pottering in the garden
- Take a brisk walk every morning
- Don't automatically use the phone or intercom at work. Walk to neighbors' house or coworkers' desks.
- Put more energy into housework like washing floors or vigorous sweeping and vacuuming.

After given the information, the aerobic exercise program was conducted by a trained instructor and takes about 45 minutes.

The patients were expected to do exercise session three times per week or at least to change their sedentary life-style into an active life-style. They were given a log book to note the date, time and the duration of their exercise program at home.

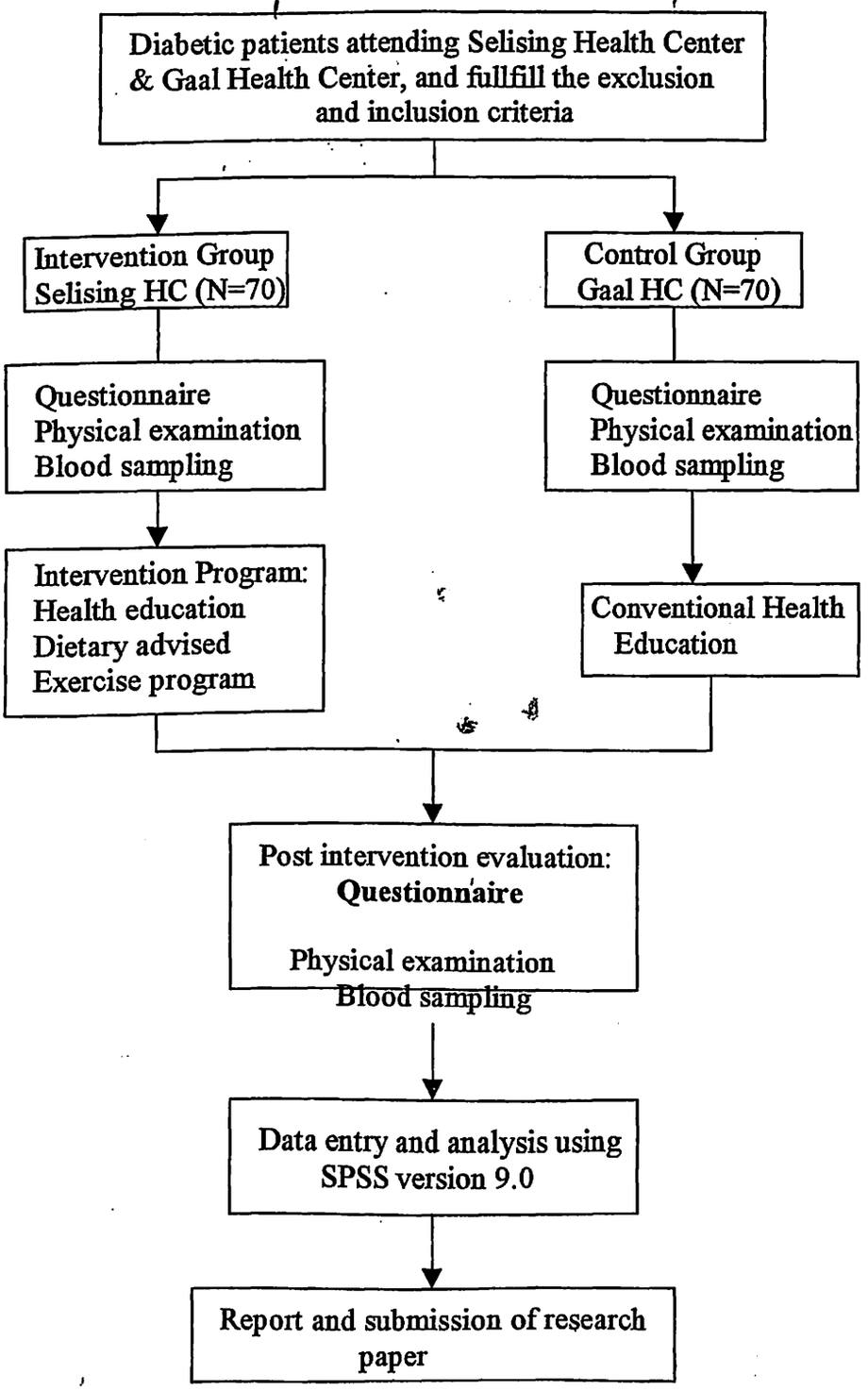
3.7. Data analysis :

Data entry and analysis was done with the help of Statistical Package of Social Science (SPSS) version 9.0 (Norusis MJ, 1999). Validation of knowledge, attitude and practice questionnaire was analysed using realibility analysis test. Cronbach's coefficient α was used to calculate scale reliability for each samples. The coefficient α for the questionnaire indicate they are reliable, $\alpha > 0.7$. Student t-test and chi-square test were used to analyse the differences between the groups at the beginning of the study. The evaluation on effectiveness of the intervention program was analysed by General Linear Models (GLM) repeated measures. The significant results in GLM were explore further using selected group Paired T-test to indicate which group give the real significant results. Age, gender, marital status, education status and duration of disease were consider as covariates and were tested using the GLM modelling. A p value of < 0.05 was taken as being statistically significant.

3.8. Ethical issue:

The research was approved by the ethical committees from Universiti Sains Malaysia and Ministry of Health Malaysia (Appendix 3,4,5).

Conceptual Framework:



4. RESULTS

A total of 140 patients was included in the study during the initial period, that was 70 patients in the intervention group and 70 patients in the control group. Only 55 patients (80%) from intervention group and 57 patients (82%) from the control group had completed the study. The total number of patients that completed the study was 112 people. Our calculated sample size was 40 patients for each group. The number of patients was higher compare to our calculated sample size as we considered 40 % drop-out during the calculation.

The major characteristic of the patients was summarized in the Table 5.1. Majority of our patients are elderly with the mean (SD) age (Intervention : Control) of 55.4 (10.20) : 54.5 (11.86) year. More than 50 % of them are female either in the intervention or in the control group. Most of them attained low education status, married and non-smoker. The mean duration of illness was about 5 years in both group. Only small proportion of them on diet therapy only and more than half of them had no other medical problem except the diabetes. The patients in both group had a similar socio-demographic characteristic as shown in table 5.1. The detail characteristic will be presented in the figures later.

Table 5.1. The characteristics of patients

Variables	Intervention gp.	Control gp.	*p* value
	N = 70	N = 70	
Mean (SD)Age (year)	55.4 (10.29)	54.5 (11.86)	NS
Gender (M:F)	29 : 41	24 : 46	NS
Education status			NS
No formal education	13 (18.6%)	20 (28.6%)	
Primary school	34 (48.6%)	29 (41.4%)	
Secondary school	22 (31.4%)	19 (27.1%)	
College/university	1 (1.4%)	2 (2.9%)	
Marital status			NS
Single	1 (1.4%)	0 (0%)	
Married	52 (74.3%)	60 (86.7%)	
Divorced	4 (5.7%)	1 (1.4%)	
Widow/er	13 (18.6%)	9 (12.9%)	
Smoking status			NS
Non-smoker	46 (66.7%)	51 (72.9%)	
Current-smoker	14 (20.3%)	7 (10.0%)	
Ex-smoker	9 (13.0%)	12 (17.1%)	
Mean (SD)duration of illness (yr)	5.6(4.81)	5.4(4.23)	NS
Type of treatment (Diet / OHA)	4 / 66	8 / 62	NS
Concomitant disease			NS
Coronary artery disease	3 (4.3%)	3 (4.3%)	
Hypertension	20 (28.6%)	20 (30.0%)	
Stroke	1 (1.4%)	1 (1.4%)	
Others	2 (2.9%)	8 (11.6%)	
No	44 (62.8%)	37 (53.7%)	

4.1. SOCIO-DEMOGRAPHIC DISTRIBUTION / BACKGROUND OF THE PATIENTS.

Figure 5.1.1 showed the distribution of age among the intervention and control group are almost similar. Majority of them aged between 40 to 60 year old. The mean (SD) age of the patients (Intervention group : Control group) were 56.0 (10.17) : 54.2 (11.75) year, the minimum age were 34 : 30 year and the maximum age were 81 : 79 year.

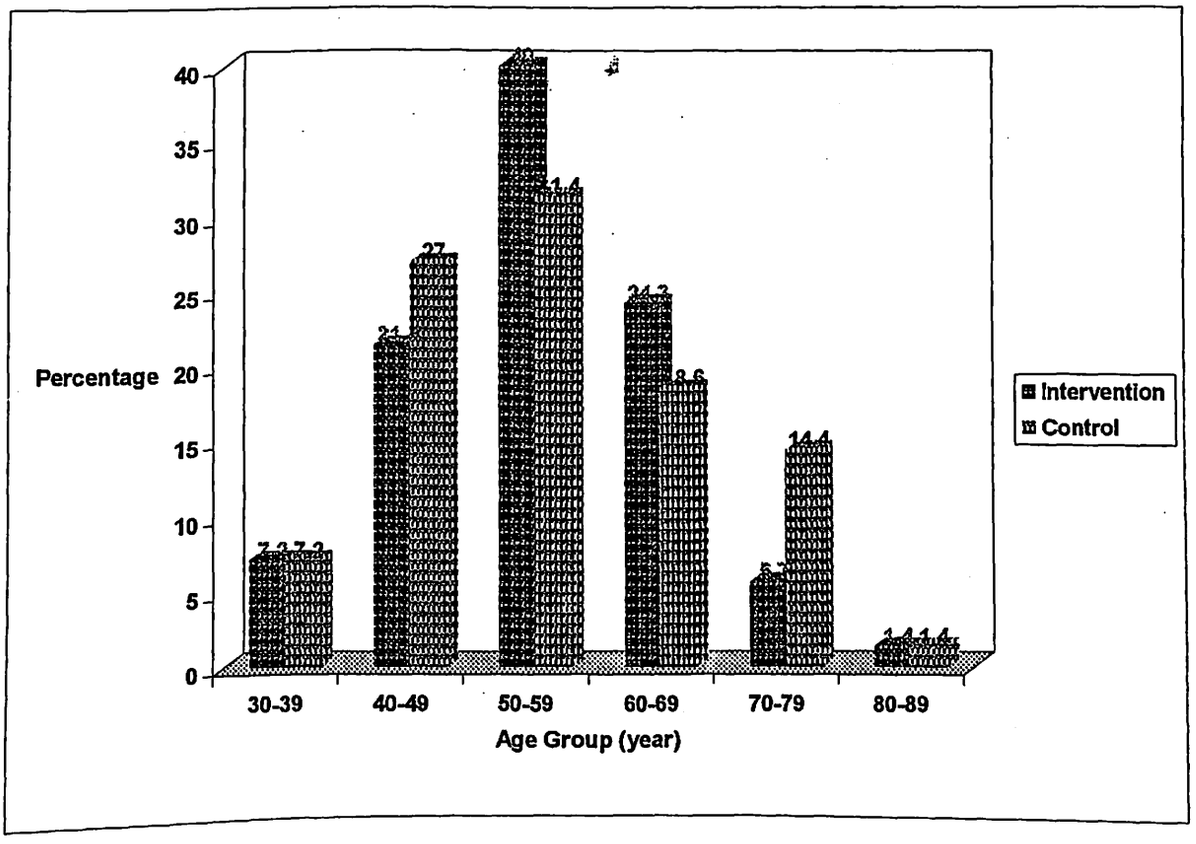


Figure 5.1.1. Distribution of patients by age group.

Figure 5.1.2 showed that majority of the patients either in the intervention or the control group are female, that is 58.6 % in the intervention group and 65.7 % in the control group. More females noted in the control group compare to the intervention group.

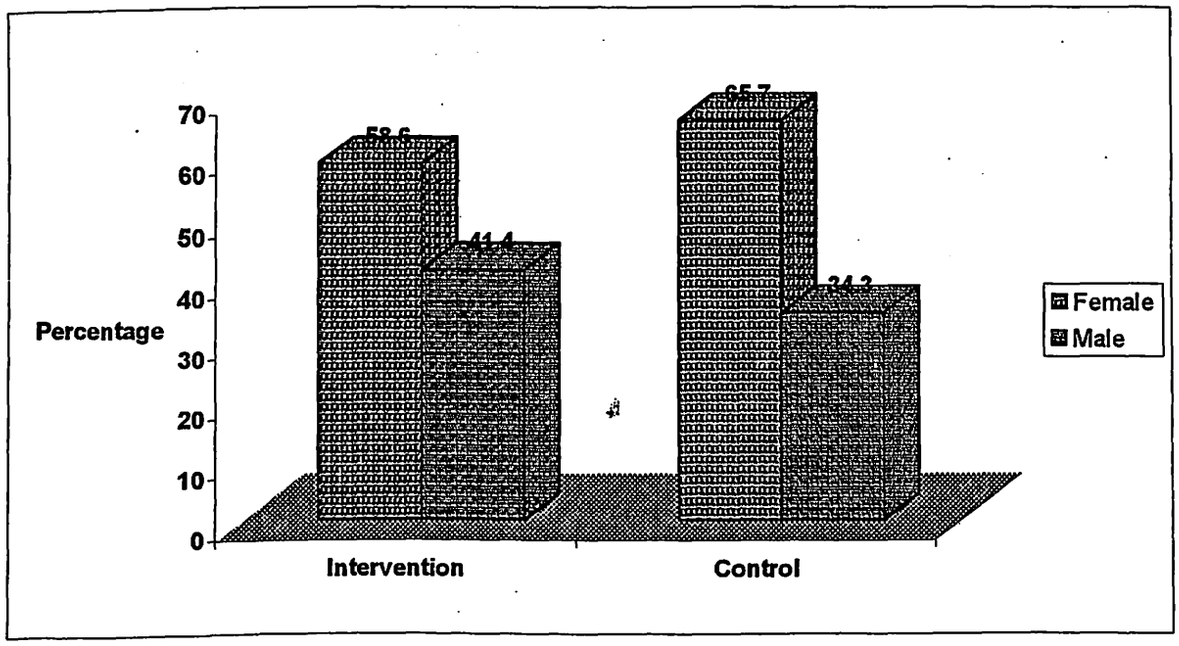


Figure 5.1.2. Distribution of patients by gender.

There is no difference in the distribution of marital status among the intevention and the control group (Figure 5.1.3). Majority of them are married, that is 74.3 % in the intervention group and 85.7 % in the control group. Only 1.4 % of the patients in the intervention group are single, whereas none in the control group.

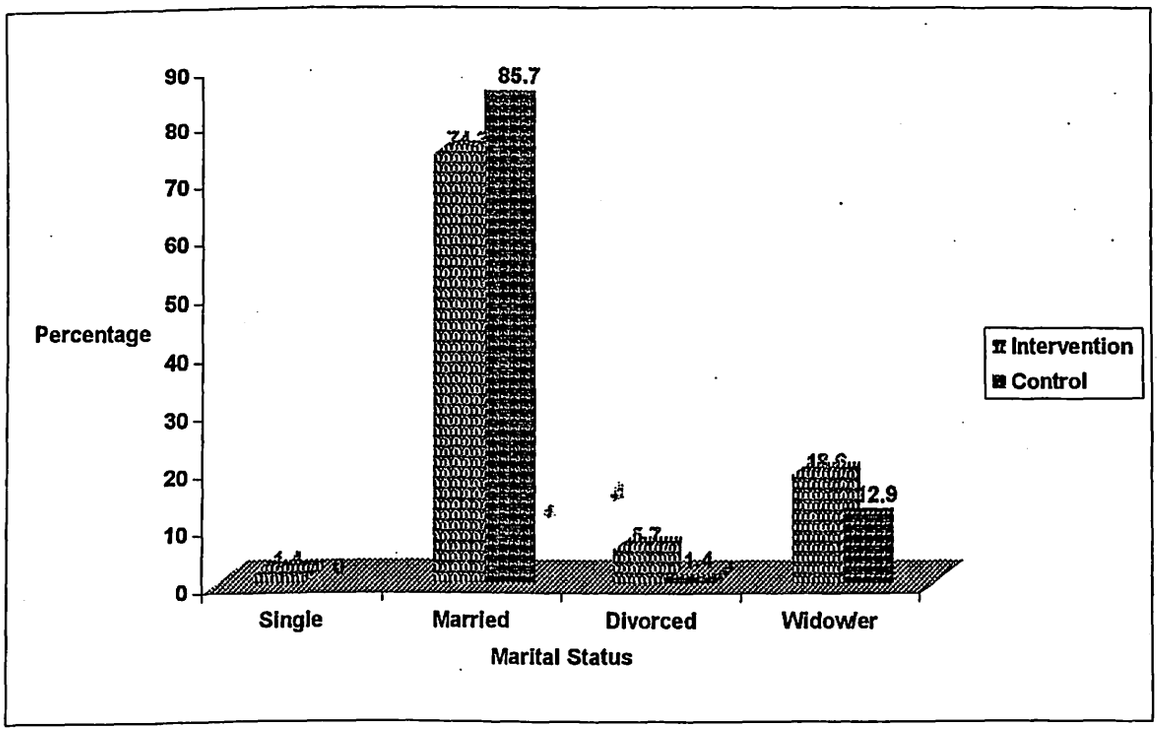


Figure 5.1.3. Distribution of patients by marital status.

The distribution of education status among the intervention and the control group are almost similar as shown in the figure 5.1.4. More than half of them either in the intervention or the control group have no formal education or up to the level of primary school. Only 1.4 % of the patients in the intervention group, and 12.9 % in the control group have college or university level of education.

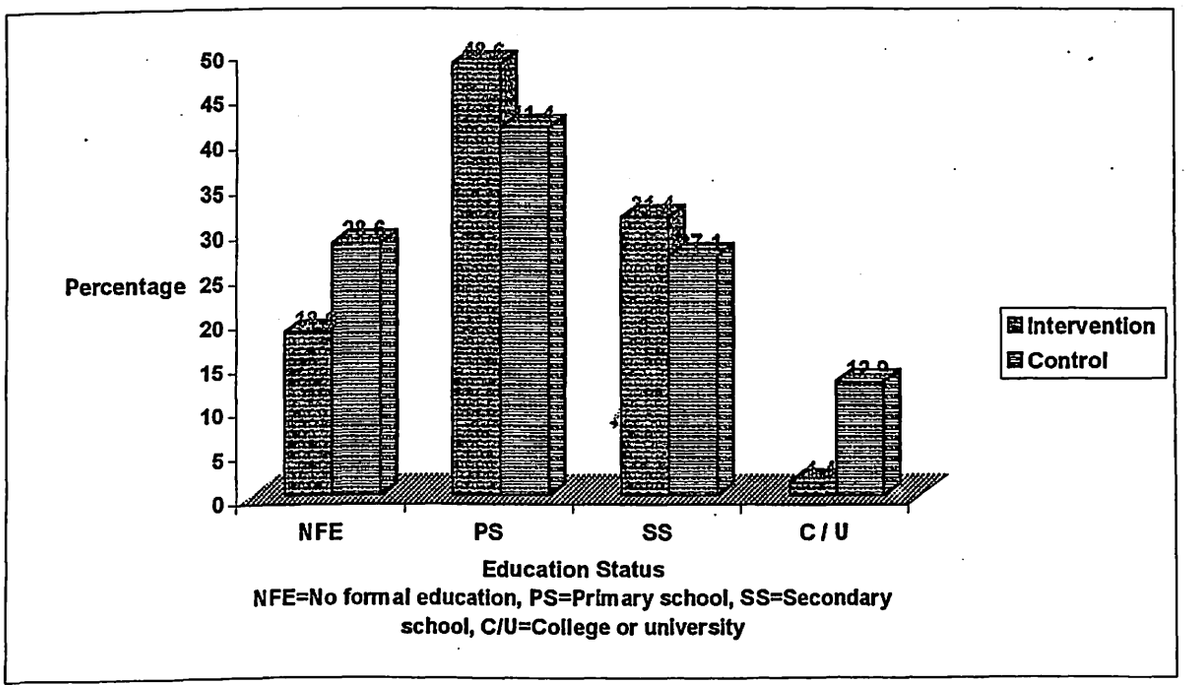


Figure 5.1.4. Distribution of the patients by education status.

Figure 5.1.5.showed the distribution of occupational type among the intervention and the control group are similar. Majority of them are housewife. Small percentage of the patients are the government staff (5.7 % in the intervention group and 12.8 % in the control group).

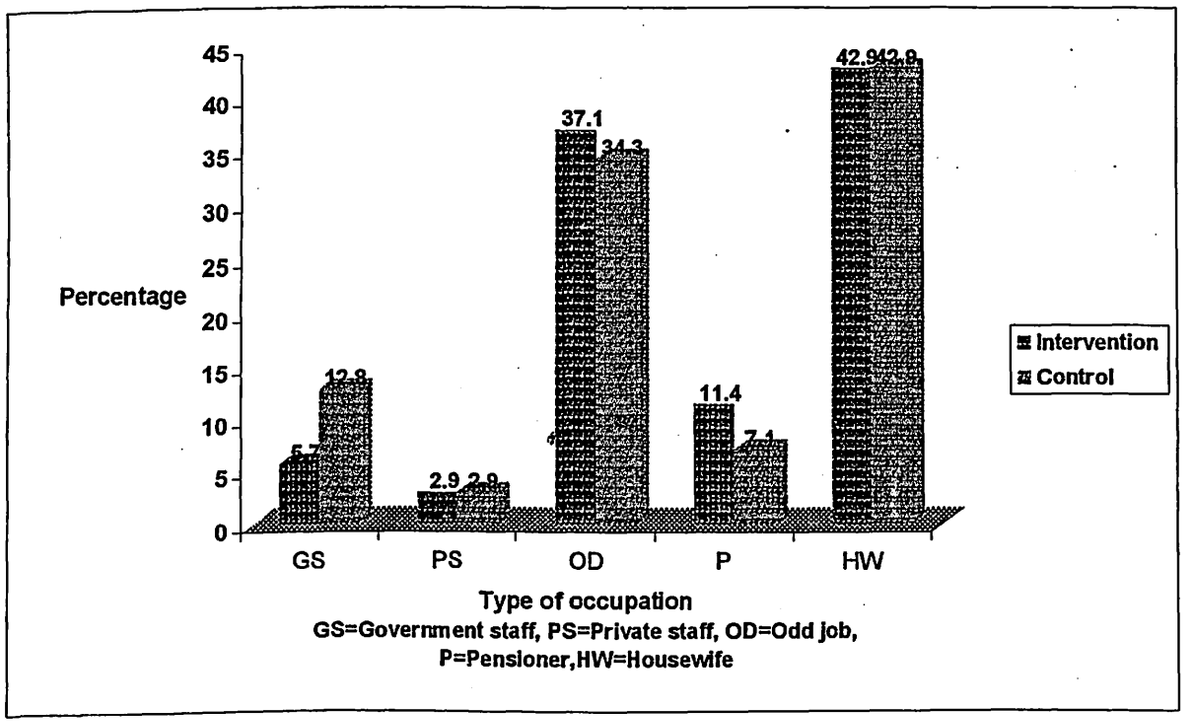


Figure 5.1.5. Distribution of patients by type of occupation.

The smoking distribution among the intervention and the control group are similar as shown by figure 5.1.6. Majority of them are non-smoker. About 30 % of the patients in both group had history of smoking either current-smoker or ex-smoker.

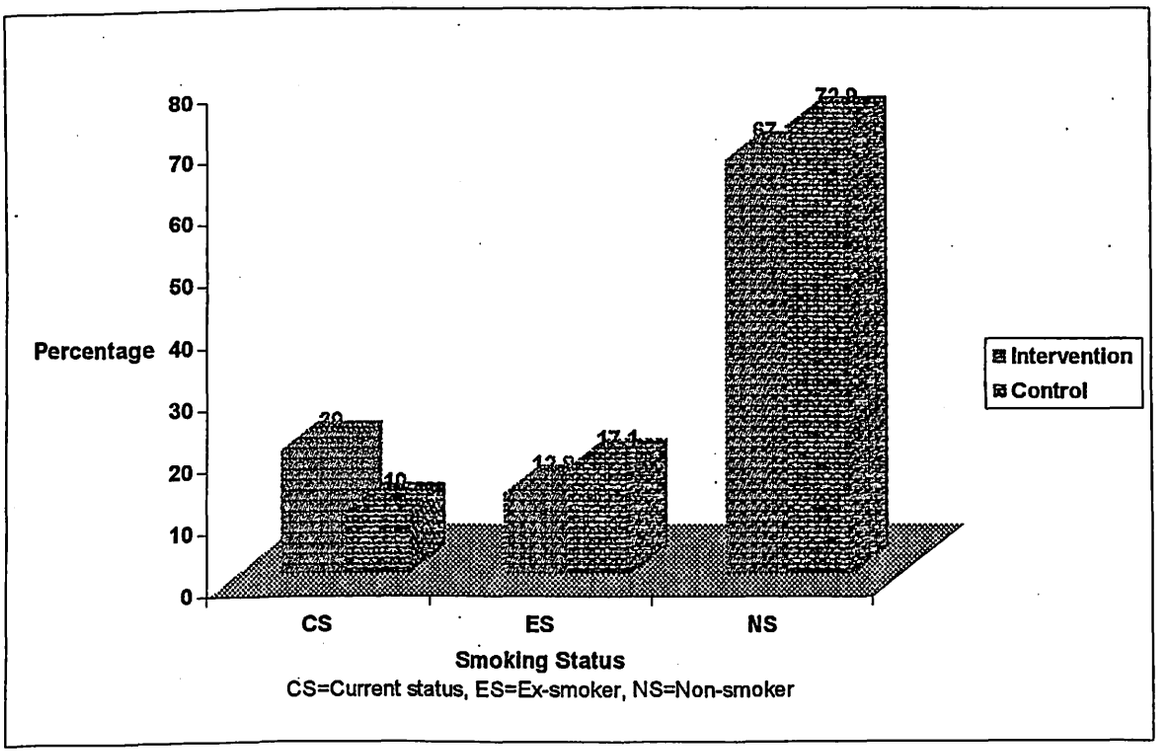


Figure 5.1.6. Distribution of the patients by smoking status.

Figure 5.1.7. Sixty percent of the patients in the intervention group had family history of diabetes compared to 51.4% of patients in the control group. In the control group, the percentage of the patients with family history of diabetes are almost the same with those without family history of diabetes.

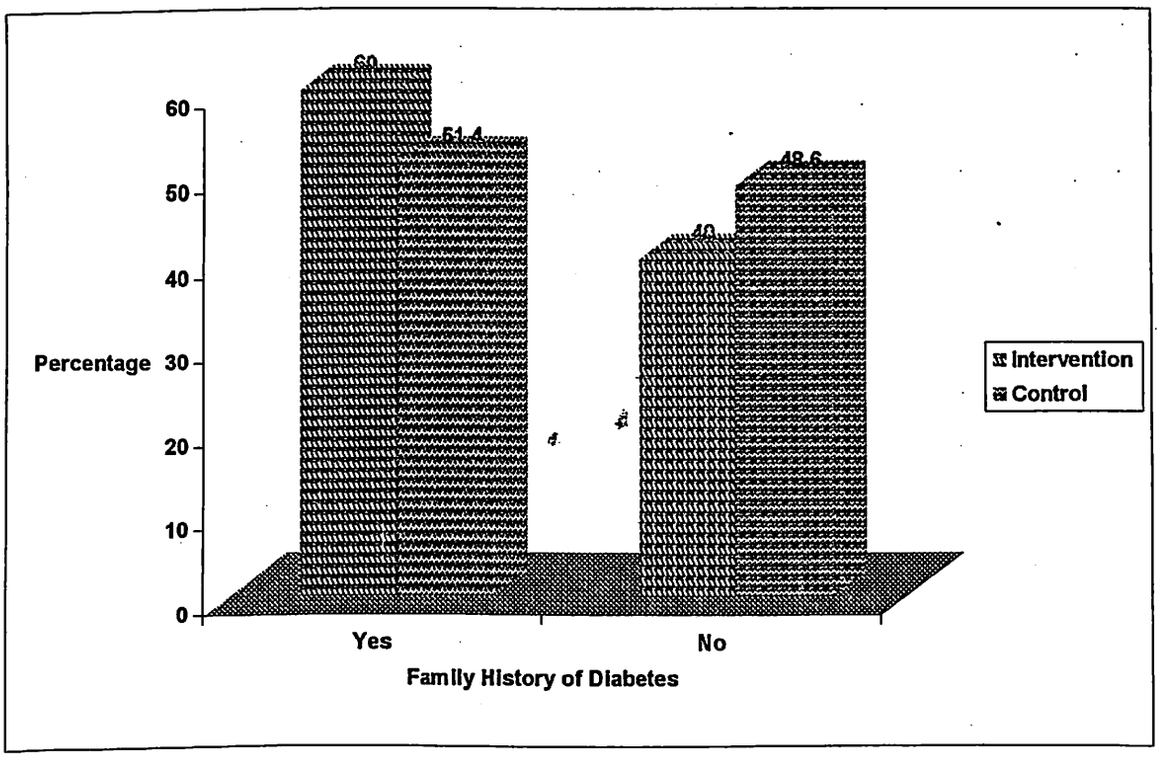


Figure 4.1.7. Distribution of patients by family history of diabetes.

Figure 5.1.8. The mean (SD) duration of diabetes was 5.6 (4.81) year in the intervention group and 5.4 (4.23) year in the control group. The distribution of diabetes duration in both group of the patients are the same. More than half of them were diagnosed within 9 years duration, that is 84.4 % in the intervention group and 77.1 % in the control group. About 3 % of the patients in the intervention group were diagnosed more than 20 years ago, whereas none in the control group.

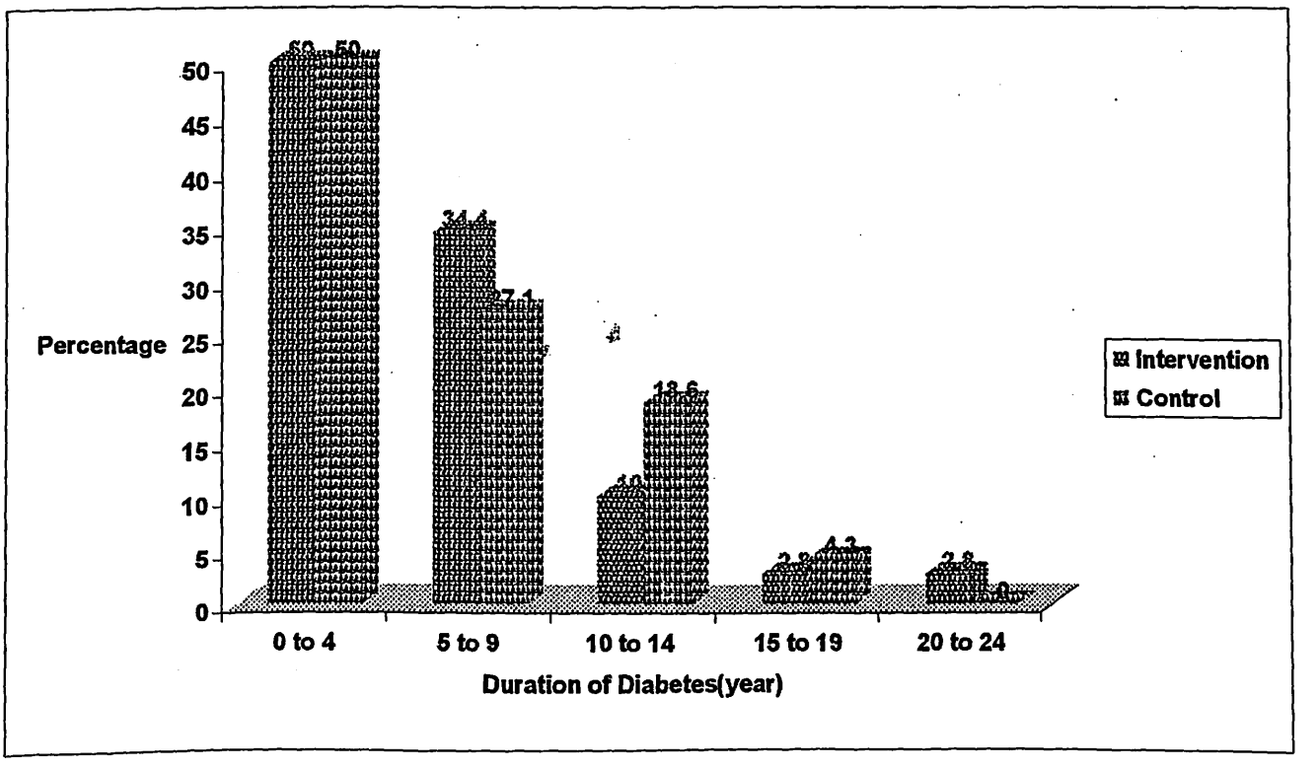


Figure 5.1.8. Distribution of patients by duration of disease.

The distribution of treatment type are similar in both group as shown in the figure below. Small proportion of patients were on diet therapy alone (5.7 % in the intervention group and 11.4 % in the control group). Majority of them were on combination of oral hypoglycaemic agents and diet therapy. One patient in the control group and none from the intervention group was on insulin therapy.

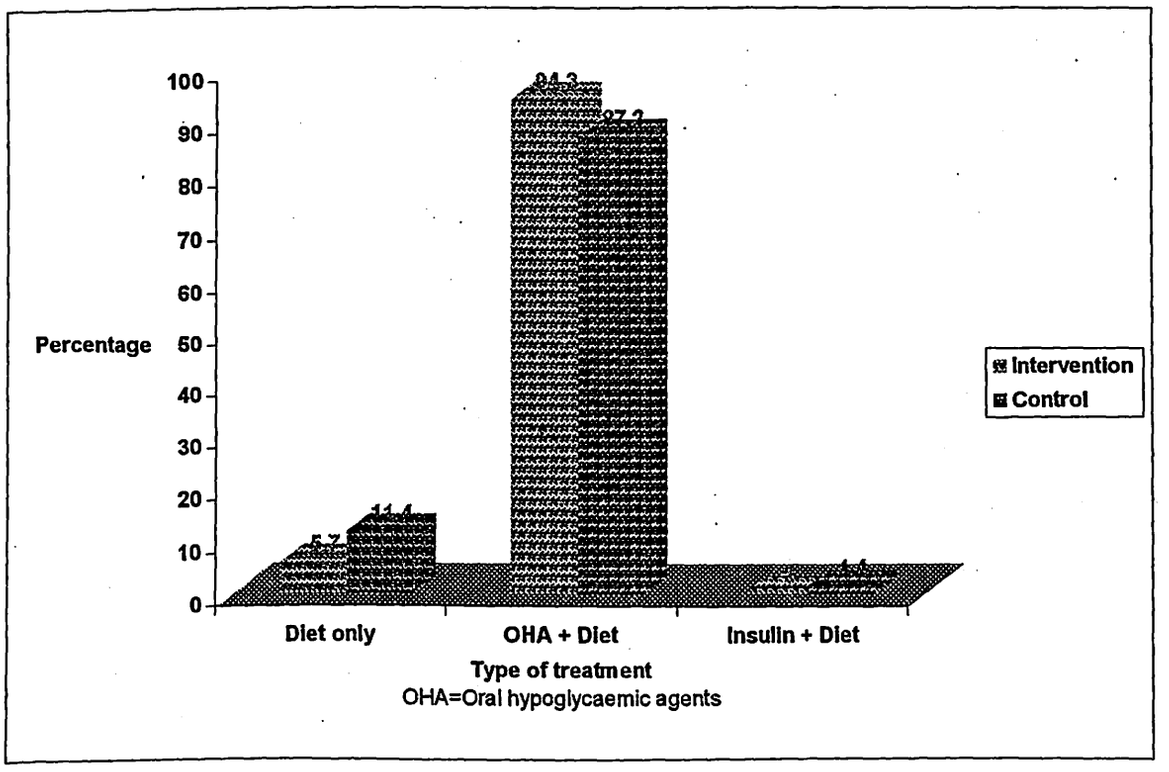


Figure 5.1.9. Distribution of patients by type of treatment.

More than half of the patients never tried the alternative treatment (51.4 % in the intervention group and 62.9 % in the control group). More patients in the intervention had history of taken alternative medicine compare to the patients in the control group as shows in figure 5.1.10.

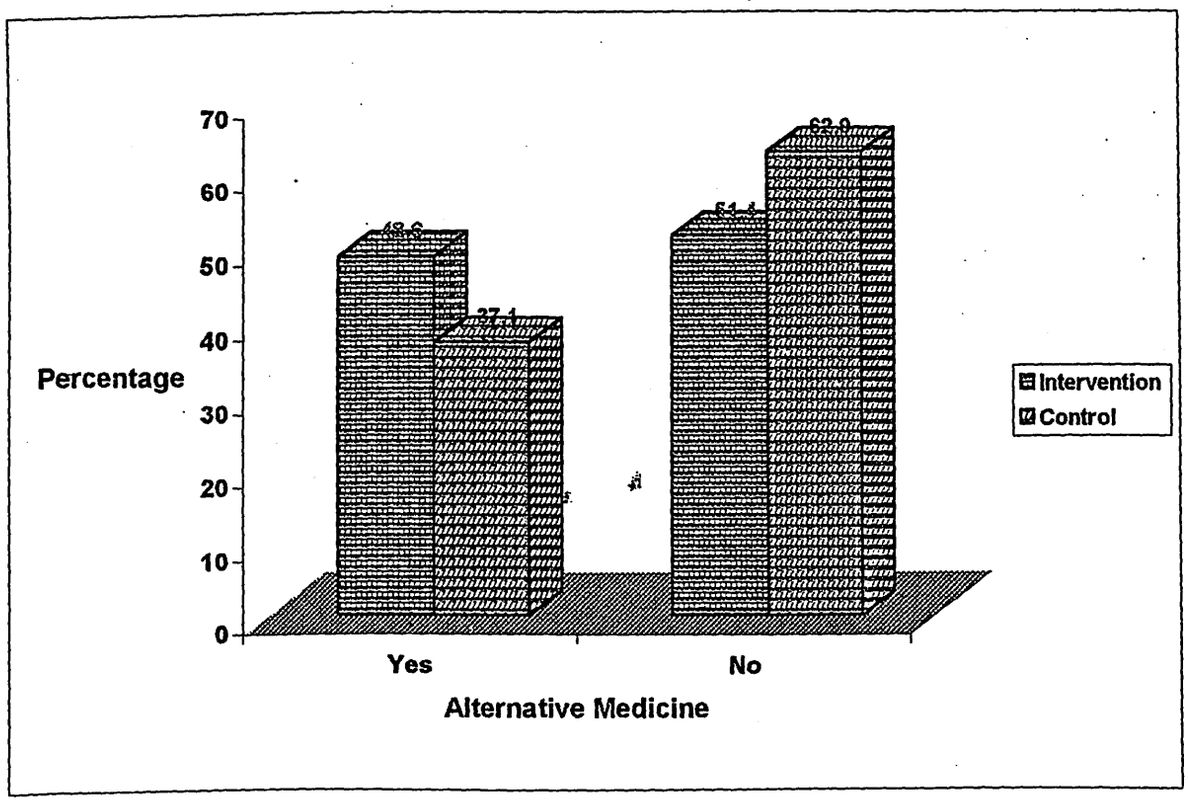


Figure 5.1.10. Distribution of patients by history of taking alternative medicine.

Figure 5.1.11 showed the distribution of patients by other medical illness. Majority of them had no other medical illness. About 30 % of them have hypertension as well. Hypertension found to be the commonest disease associated with diabetes in this study.

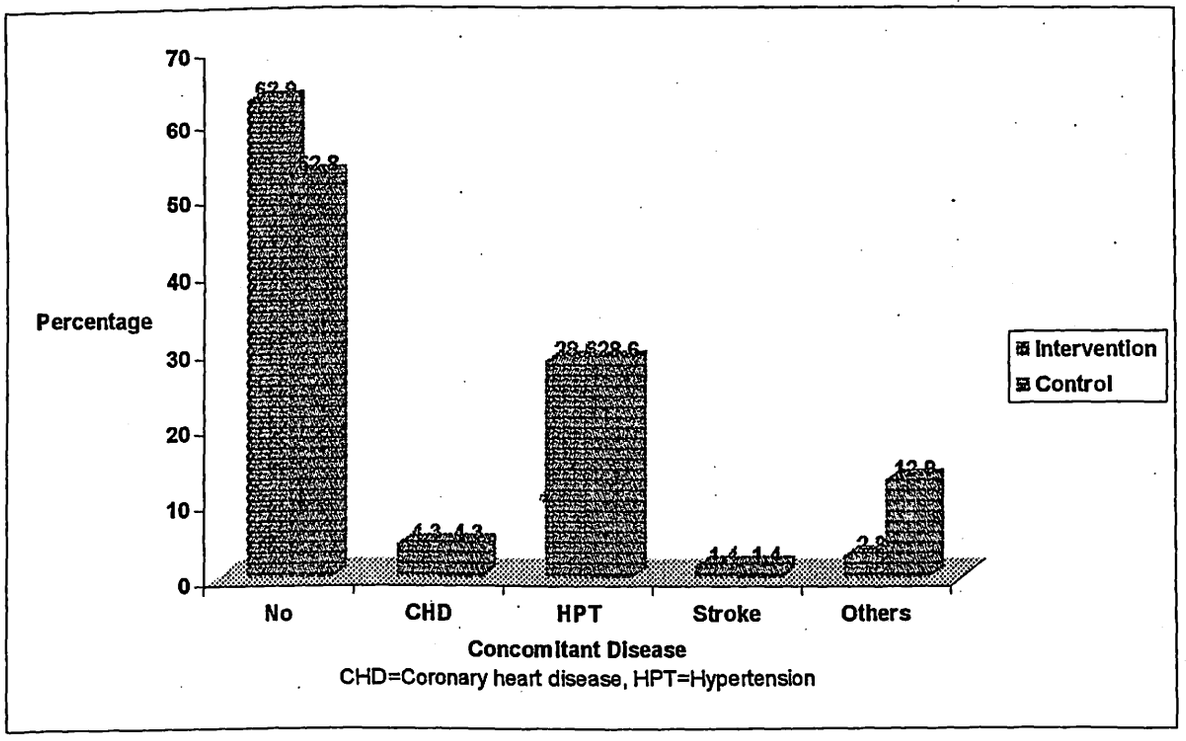


Figure 5.1.11. Distribution of patients by concomitant diseases.

The distribution of HbA1c level in both group were almost the same as shown in figure 5.1.12. Majority of them had poor glycaemic control (82.9 % in the intervention group and 70.0 % in the control group). The mean (SD) of the patients (Intervention : Control group) were 10.3 (2.87) % : 9.3 (2.54) % , the minimun level of HbA1c were 6.2 % : 5.0 % and the maximum level were 18.5 % : 14.0 %.

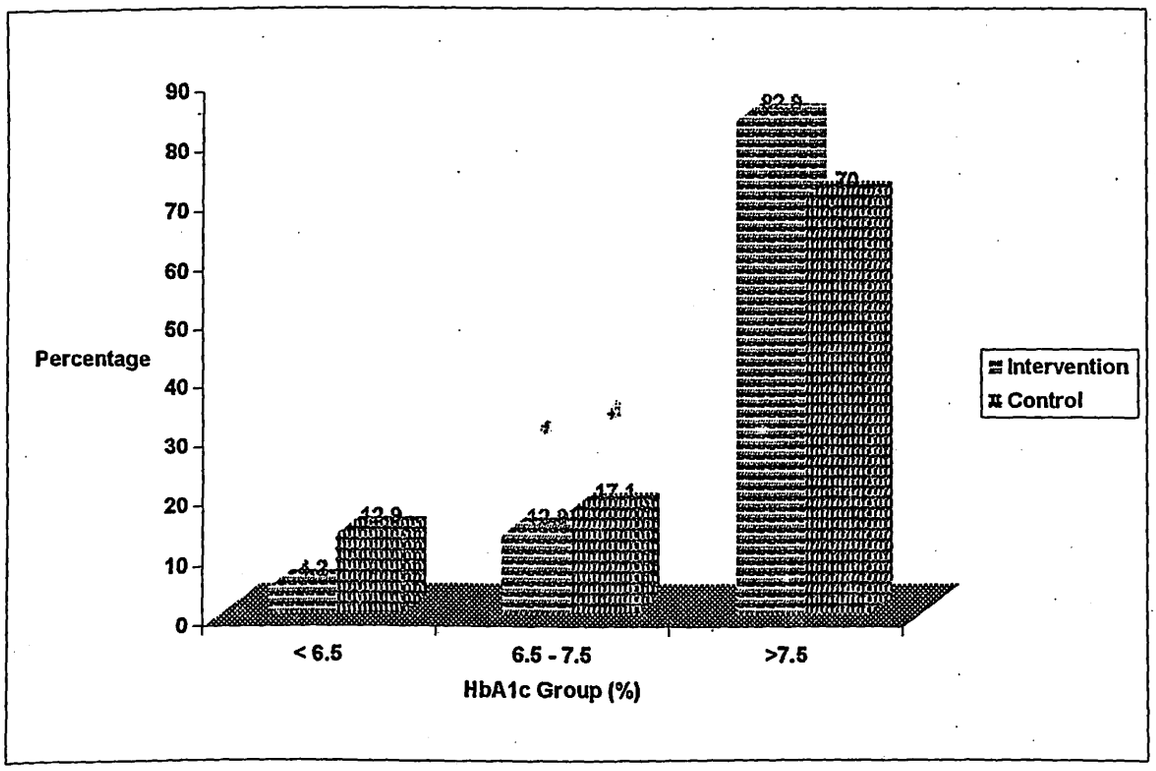


Figure 5.1.12. Distribution of patients by level of HbA1c.

Figure 5.1.13 showed the distribution of random blood sugar (RBS) level. Only 11.4 % of patients in the intervention and 14.2 % in the control group had RBS level less than 7.0 mmol/l. About 60.0 % of patients in both group had RBS level more than 10.0 mmol/l. The mean (SD) RBS was 13.7(7.43) mmol/l in the intervention group and 12.4(5.56) mmol/l in the control group. The minimun level was 2.7 mmol/l in the intervention group and 4.1 mmol/l in the control group whereas the maximum level was 35.6 mmol/l in the intervention group and 28.2 mmol/l in the control group.

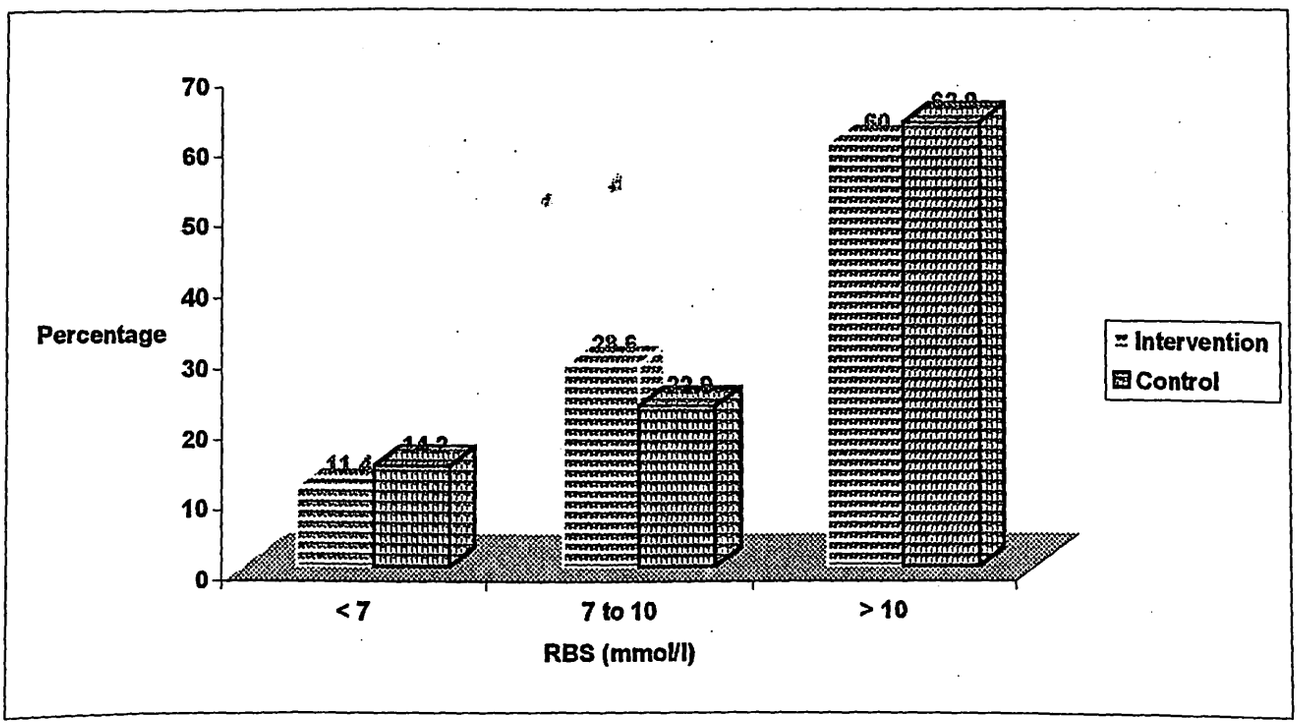


Figure 5.1.13. Distribution of patients by RBS level.

The distribution of BMI in both group were shown in figure 5.1.15. More than half of the patients in both group were either overweight or obese. The mean (SD) BMI of the patients (Intervention : Control group) were 26.1 (4.08) kg/m^2 in the intervention group and 26.6 (4.30) kg/m^2 in the control group. The minimum value were 18.1 kg/m^2 : 18.2 kg/m^2 (Intervention : Control), and the maximum value were 38.0 kg/m^2 : 43.4 kg/m^2 (Intervention : Control)

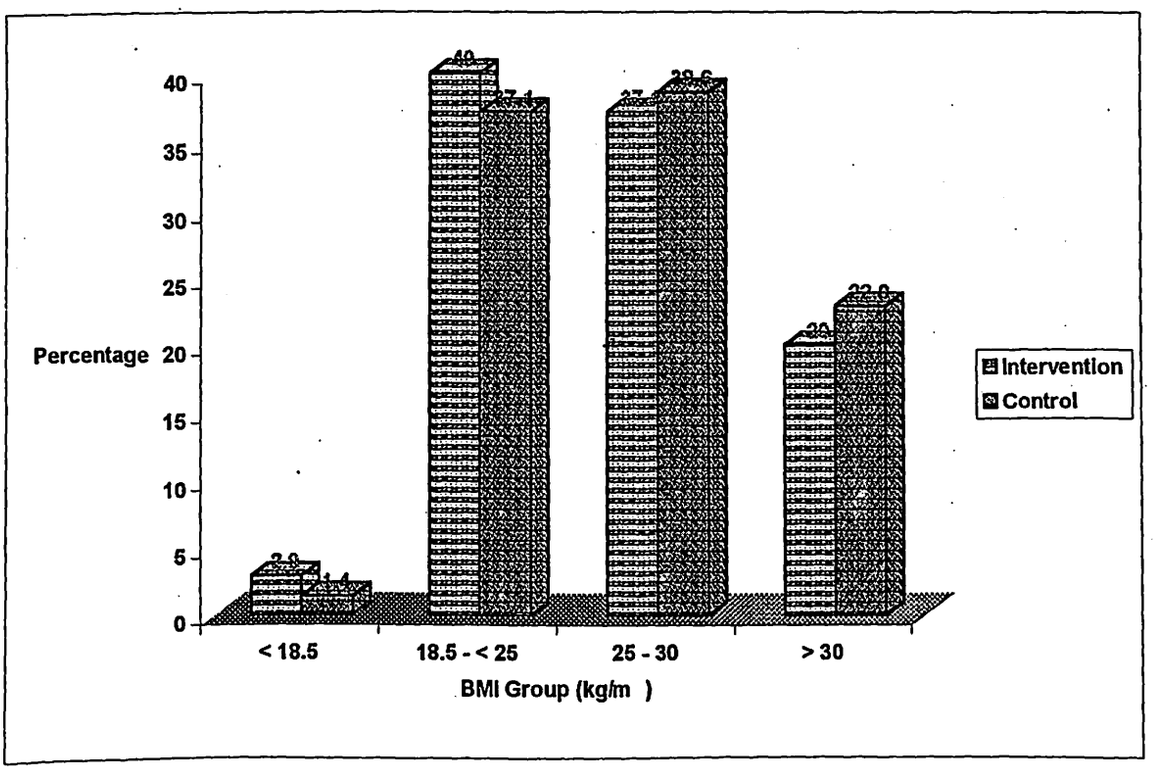


Figure 5.1.14. Distribution of patients by BMI group.

4.2 Hypothesis testing of the glycaemic control.

Table 5.2.1. The mean difference between the pre and post-intervention program.

The pre and post-intervention value was analyzed by GLM-repeated measures. The table below showed that, there were a significant difference of mean HbA1c and BMI between pre and post-intervention program. The mean RBS have no significant difference between pre and post-intervention program.

Table 5.2.1. The mean difference between the pre-intervention and post-intervention program.

Variable	Mean (SD) pre	Mean (SD) post	P value
HbA1c (%)	9.7 (2.73)	8.9 (2.28)	<0.001
RBS (mmol/l)	12.5 (6.25)	11.4 (4.81)	NS
BMI (kg/m^2)	26.3 (4.04)	25.9 (3.92)	<0.01

For the significant result in the GLM-repeated measures analysis, the paired T-test with selected group were perform to find out in which group actually the significant results occur. Table 5.2.2 showed the significant improvement of HbA1c and BMI in the intervention group but not in the control group.

Table 5.2.2. The mean difference between pre and post-intervention program among the intervention and control group.

Variables	Mean difference		P value		95 % CI	
	intervention	control	intervention	control	intervention	control
1. HbA1c (%)	1.5(2.27)	0.4(1.56)	0.000	NS	0.83 - 2.10	-0.01 - 0.835
2. BMI (kgm^{-2})	0.5(1.41)	0.2(0.98)	0.019	NS	0.08 - 0.86	-0.07 - 0.45

Using the GLM-repeated measures, we explore further to identify the covariates of the outcome variable. The result indicate that the age, gender, marital status, level of education and duration of disease were not the covariates for the HbA1c nor the BMI.

4.3 Knowledge, attitude and practice.

4.3.1 Knowledge.

There are 5 knowledge question, each question have 5 answers and the patients need to give a respond for each answer either yes, no or don't know. Score 'one' was given for the correct answer, and score 'zero' for uncorrect answer or those who gave the respond of don't know. The maximum score for the knowledge was 25.

On the question regarding the diabetes mellitus, majority of the patients didn't know the causes of diabetes and its treatment. They believed that the oral hypoglycaemic agents is the only treatment for diabetes. More than half of them know that obese is one of the risk factor for diabetes and diabetes can cause blindness.

Table 5.3.1.1. Regarding the diabetic patients

Answers	Correct (%)	Uncorrect (%)
A. There is a glucose in the urine	77.1	22.9
B. Diabetes is caused by the failure of kidney to control the glucose level.	8.6	91.4
C. One of the risk factors is obese.	69.3	30.7
D. If not control, can cause blindness.	79.3	20.7
E. Drug therapy is the only mode of treatment.	20.0	80.0

Table below showed majority of the patients give the correct answer for the symptoms of diabetes. They know that frequent micturation, thirst, unhealing ulcer or skin infection, loss of weight and easily malaise and lethargic are the symptoms of diabetes.

Table 5.3.1.2. The symptoms of diabetes.

Answers	Correct (%)	Uncorrect (%)
A. Frequent micturation	91.4	8.6
B. Feeling of thirst.	90.7	9.3
C. Ulcer or skin infection that delay in healing.	85.0	15.0
D. Weight loss inspite of good appetite.	87.9	12.1
E. Easily malaise or fatigue.	90.0	10.0

Majority of the patients cannot give the correct answer for the meaning of ideal body weight (Table 5.3.1.3). They have their own interpretation for this question. More than half of them believed that the thin people have an ideal body weight.

Table 5.3.1.3. The ideal body weight.

Answers	Correct (%)	Uncorrect (%)
A. Body weight that appropriate to height.	62.9	37.1
B. The body shape like a pear.	39.3	60.7
C. Hip is smaller than waist.	31.4	66.6
D. Waist is smaller than chest.	22.7	77.9
E. People who are thin.	47.1	52.9

Majority of the patients had a good idea regarding the meaning of healthy diet (Table 5.3.1.4). However, more than half of the patients believed that the delicious food is part of healthy diet.

Table 5.3.1.4. The healthy diet.

Answers	Correct	Uncorrect
A. High fibre diet like vegetables.	90.7	8.6
B. Food with low fat content.	79.3	20.7
C. Balanced diet.	91.4	8.6
D. Delicious food.	47.9	52.1
E. Food with high sugar content.	85.0	15.0

Table below showed majority of the patients know that exercise can reduce the body weight, control the blood glucose level, reduce the blood pressure and lower the risk of developing cardiovascular disease.

About 35 % believed that exercise can cause the diabetes.

Table 5.3.1.5. The effects of exercise or physical activity.

Answers	Score 1 (%)	Score 0 (%)
A. Can reduce the body weight.	90.0	10.0
B. Can cause diabetes	63.6	36.4
C. Can control the blood glucose level	82.9	17.1
D. Can reduce the blood pressure	75.7	24.3
E. Can lower the risk of developing cardiovascular disease.	72.9	27.1

4.3.1 Attitude.

There are five questions in this part. The patients need to answer all the questions. The score was given for each answer, and it was given as below:

1. Strongly agree for correct answer score 5
2. Agree for correct answer score 4
3. Unsure for correct answer score 3
4. Not agree for correct answer score 2
5. Strongly not agree for correct answer score 1

For the uncorrect answer, the score will be reversed eg. strongly agree for uncorrect answer, the score was 1. The maximum score for attitude was 25.

Majority of the patients has a good score for this part (Table 5.3.2). They agree with the statements that was given. Most of the patient didn't gave the answer of strongly agree or strongly not agree even they know the correct answer. More than half of the patients agree that they should know their blood glucose level, should maintain their ideal body weight, should take a variety of food and should do an exercise. About 40% of the pateints were uncertain regarding their body weight.

Table 5.3.2. The percentage for the score of attitude.

Questions	SCORE				
	5	4	3	2	1
Q6. You should know your blood glucose level .(%)	11.6	70.7	11.4	6.4	0
Q7. You have an ideal body weight.(%)	0	60.5	16.4	22.9	0.7
Q8. You should maintain the ideal body weight. (%)	2.9	84.3	10.7	2.1	0
Q9. You should take a variety of food and balanced diet to maintain your health.(%)	5.7	80.7	12.9	0.7	0
Q10. You should exercise to reduce the risk of developing diabetes. (%0	5.0	80.7	12.1	2.1	0

4.3.2 Practice.

For question Q11 and Q12, the score 1 was given respond "Yes" and score 0 for respond "No". majority of the patients know how much they take the sugar every day. Most of them also have an effort to prevent from eating too much.

Table 5.3.3.1. Practice on sugar intake and eating habit.

Questions.	Yes	No
Q11. Do you know how much sugar did you take everyday?	62.9	37.1
Q12. Do you have an effort to prevent from eating too much?	92.1	7.9

Question Q13 explore regarding the type of cooking that the patients practice everyday for their meal. The aim was to assess their practice on healthy diet. For steam, baked and soup; score 3 was given for always, score 2 for frequent and score 1 for never. For fried, oily soup or used of coconut milk; score 3 was given for never, score 2 for frequent and score 1 for always.

Based on the answer we found that patients didn't have particular type of cooking (Table 5.3.3.2.). They change it everyday, therefore most of them give the answer of always for each questions. More than half of the patients always fried their food.

Table 5.3.3.2. Type of cooking.

Q13. Type of cooking	Score 3 (%)	Score 2 (%)	Score 1 (%)
A. Steam	15.7	55.0	29.3
B. Fried	0	39.3	60.7
C. Baked	42.9	53.6	3.6
D. Soup	47.9	48.6	3.6
E. Oily soup	12.9	70.0	17.1
F. Used coconut milk.	14.3	59.3	26.4

For question Q14 score one was given for respond "yes" and score zero for "No". About 80% of the patients claimed to have an exercise or doing a physical activity at home (Table 5.3.3.3)

. Table 5.3.3.3. Exercise

Question	Yes(%)	No(%)
Q14. Do you always exercise or doing a physical activity?	81.4	18.6

4.4 Hypothesis testing of knowledge, attitude and practice.

The table below showed that, both group of patients had a similar level of knowledge, attitude and practice at the beginning of the study. The mean score for knowledge (Intervention:Control) was 16.5 : 17.1 ($p>0.05$), attitude was 18.8 : 18.5 ($p>0.05$) and practice was 14.5 : 14.2 ($p>0.05$).

Table 5.4.1. The mean difference of baseline knowledge, attitude and practice score between the intervention and control group.

Variables	Mean (SD) score		P value	95 % CI
	Intervention	Control		
1. Knowledge	16.5 (4.49)	17.1 (3.90)	NS	-0.76 - 2.02
2. Attitude	18.8 (1.93)	18.5 (1.99)	NS	-0.96 - 0.36
3. Practice	14.5(2.13)	14.2 (1.86)	NS	-0.95 - 0.38

After the intervention program there was a significant difference in mean score of knowledge and practice but not the attitude (table 5.4.2).

Table 5.4.2. The mean difference of knowledge, attitude and practice score between the pre and post-intervention program

Variable	Mean (SD) pre	Mean (SD) post	P value
Knowledge	16.8 (4.18)	20.4 (4.63)	<0.001
Attitude	18.6 (1.89)	18.7 (1.65)	NS
Practice	14.1 (2.00)	15.0 (2.18)	<0.001

After the intervention program, there were a significant difference in mean score of knowledge and practice for the intervention group, but no difference in the control group. In the intervention group, the mean knowledge improved by 7.35 and practice improved by 1.47.

Table 5.4.3. The mean difference of knowledge, attitude and practice score between pre and post-intervention program for the intervention and control group.

Variables	Mean difference		P value		95 % CI	
	Inter.	Control	Inter.	Control	Inter.	Control
1. Knowledge	7.35	0.07	<0.000	NS	-8.63-(-6.06)	-0.74-0.88
2. Practice	1.47	0.30	<0.005	NS	-2.33-(-0.62)	-0.85-0.25.

Using the GLM-repeated measures, we explore further to identify the covariates of the outcome variable. The result indicate that the age, gender, marital status, level of education and duration of disease were not the covariates for the knowledge nor the practice.

5. DISCUSSION

There are 70 patients in each group before the intervention program. Most of them are elderly and have longer duration of diabetes. All of them except one are Malays. Majority are females, married and attained low education status. In the intervention group the ratio of female : male was 58.6 % : 41.4 %, whereas in the control group was 65.7 % : 34.3 %. About 15 % of them were current-smoker. About 30 % smokers were reported in the Malaysian diabetic patients (Rokiah P, 1998). Our prevalence was lower compared to percentage of smoking among diabetes in Liverpool that is 30 % (Ismail AI et at., 1998). The lower prevalence in our population can be explained by the difference method of assessing the smoking status. In our study, we are using the interview method where the patients may give a wrong information, whereas in Liverpool, they measured the breath carbon monoxide and urinary cotinine which are more objectively compared to our method.

During the initial study, the glucose level of the patients are poorly control in both group. The mean HbA1c in both group are more than 7.5 %. These result are similar with the study done before in our country (Lim TO, 1990, Chan SC et al., 1997, Chan SP, 1998). However type 2 diabetic patients in urban Malaysia had a better glycaemic control with mean HbA1c level of 7.7% (Ruzita et al., 1996). The difference probably because patients in the urban area have a better health facilities and knowledge about diabetes compared to our patients in the rural area. Globally, studies showed that the mean HbA1c

were ranging from 6.8 % to 11.8 % (Turner R et al., 1996, Stratton R et al., 1987, Yudkin JS et al., 2000, Unwin N et al., 1996).

More than half of the patients (55.5%) has BMI more than 25.0 kgm^{-2}, well above the acceptable value. The Malaysian diabetic population also showed a similar result (Rokiah P, 1998). However, army, who supposed to be active group has higher prevalence of overweight and obesity compare to our study, where 68.7% of the diabetic army had BMI more than 25.0 kgm^{-2}(Maznorella M et al., 1998), although data have suggested that exercise may improve weight reduction (American Diabetic Association, 1997, Horton ES et al., 1988).

Regarding the knowledge, attitude and practice, the patients were interviewed using questionnaire by the author. They were explained further if they cannot understand the question. The mean (SD) total score for knowledge, attitude and practice were above 50 %, that was 67.2 (4.18) % for knowledge, 74.4 (1.89) % for attitude and 67.1 (2.00) % for practice. Even though the total score was quite high, but they were still lack on the certain area. For example, regarding the knowledge, majority of them could not defined the ideal body weight and healthy diet, but they have a good score on the symptoms of diabetes. This was because the ideal body weight and healthy diet are something new to them compare to the symptoms of diabetes as they had experienced it. Some of the patients may be not really understand the question and prone to guest the answer either 'yes' or 'no'.

Study done by Yu et al. at Bukit Mertajam Hospital, concluded that the knowledge of diabetic patients regarding the management of diabetes were poor (Yu CC et al., 1998). Bloomgarden et al. reported the mean score of knowledge on diabetes among their patiets was 66 % (Bloomgarden ZT et al, 1987), that was almost similar to our patients mean score of knowledge.

Based on the baseline result we found that the patients had a higher score for attitude compare to knowledge and practice. This result was different from study done by Lennon et al. where they found the score of attitude was higher compare to the knowledge score (Lennon GM et al., 1990).

After the intervention program which consist health education on nature of diabetes, self-care and management of diabetes, exercise and dietary advised, we found there are some significant result.

Among the intervention group, the mean HbA1c and BMI level had significantly improved, whereas no significant difference found in the control group. The mean HbA1c level was improved by 14.6% from the baseline value. Other studies showed a varies improvement ranging from 11.0% to 27.0% (Gaede P et al. 2001, Lennon GM et al., 1990, Rubin RR et al., 1989, Yudkin JS et al., 2000). The mean BMI was improved by 2.0% in this study , which was smaller compare to the study done in London that was 5.0% (Yudkin JS et al., 2000). The RBS level had no significant difference in both group as RBS only provide a short-term measurement of glucose control (Service FJ et al.,

1987). Most of the patients take meals within 2 hours before come to clinic and have their blood checked.

Regarding the scores of knowledge, attitudes and practice, we found that knowledge and practice scores were significantly improved in the intervention group and the improvement in knowledge was more prominent compare to the practice . Again there is no significant difference in the control group. The score of attitude had no significant difference in both group as the score was already high at the baseline. Based on these result, we found that our intervention program had effectively improved the knowledge of the patients as well as their practice and blood glucose level. However we cannot assess how long they can maintain these changes.

The mean post-intervention level of the HbA1c was still far from the acceptable value, may be we need to give more longer duration for the patients to improved further. In a large, complex, control trial that simultaneously investigated the efficacy of patients and physician education, Mazucca et al reported a beneficial effects of patients education on HbA1c level after 11 - 14 month duration. (Mazucca SA et al., 1986). However another study in Juruselam, the researcher found that the effect of health education program on diabetes control was impressive where the improvement was already achieved after 4 month of program as evident of weight reduction and improvement in pre- and post-prandiol blood glucose level together with a significant reduction in HbA1c level (Raz I et al., 1988).

A part of metabolic control, diabetes education also can promote long- term benefits in self-care and emotional status if the program is specifically designed to provide these benefits (Rubin RR et al., 1989).

In study by Gaede ae al., they found that the intensive group had lowers value of HbA1c, and fasting value of serum total-cholesterol, LDL-cholesterol and triglycerides than the standard group after 3.8 years after intervention (Gaede P et al., 2001). In our study we are not measuring above parameters except for the HbA1c.

A study among type 1 diabetic patients also found that patients completing the education program showed improved in blood glucose control, greater knowledge, more favourable attitudes and increase competence in technical skills (Lennon GM et al., 1990).

The result of this study are not consistent with diabetic education study done by Bloomgarden et al; where they found that patients education may not be an efficacious therapeutic intervention in most adults with insulin-treated diabetes mellitus (Bloomgarden ZT et al., 1987).

Based on the result of these study, we found that the health education on healthy life-style is an essential component of effective diabetes management. However the success of permenent life-style change is dependent on the patients' degree of motivation,

psychosocial condition, risk profile and compliance (Gaede P et al., 2001) which was not measured in this study.

5. Limitations of the study.

Although the outcome of this study are impressive, the result must be interpreted in light of certain limitations.

The samples are not representative to all the diabetes population in Kelantan as the samples were not randomized into the intervention and the controlled group. The health centers were already selected for the intervention and the control group. The selection bias was try to eliminate by matching the socio-demographic data of the patients in both group.

The interview was conducted by the author herself. There were patients who may be agreeable to all questions asked, they might felt that saying "no" to the questions may not right thing to do in front a doctor. The respondents may not really understand the questiones asked, therefore they may be answered "yes " or "no" at random to cetrain questions.

In a questions such as duration of diabetes or history of smoking, the answer may subject to recall bias. Some of them may give a rough ideal for the answer as they were unable to recall properly.

The time and budgets constraints limited our study to evaluate a long-term effect of changes in their knowledge and practice on healthy life-style. We only have a single measurement, 5 month after the intervention program.

The effect of the intervention program was assessed as a whole including the health education on self-care management, dietary advised and exercise. We cannot estimates which type of education gave an adverse positive effect as we are not measuring the effect of each program.

We also noted that not all of the paients in the intervention group completed the health education program, as the attendance of each sessions were about 70 - 80%. The patients was given the date they should attend the clinic for the intervention program at the initial of the study and later reminded by the health staff..

6.Recommendations

In this study we found that the health education on healthy life-style is an important component in improving the glycaemic control among diabetic patients. Several recommendations are suggested as below:

6.1 A diabetic team consist of medical officer, medical assistant and nurses should be develop at the health center level. This team will responsible in conducting the program for the diabetic patients. A program can include as a talk given during the diabetic clinic day or the diabetic campaign at the health center level. A regular heath education must be scheduled out as our patients needs to be remind regularly.

6.2 Regular talk by the dieticient on healthy diet should be given as most of our patients have no clear idea regarding the type and proportion of diet they need. They must have a good idea or knowledge about diet as diet is an important tool in controling the blood glucose level.

6.3 Monitoring of blood glucose level should not depends on RBS only. the patients need to assess the HbA1c level as this test is more reliable in monitoring the blood glucose level.

6.4 Screening of the chronic complications is also the important part in managing the diabetes patients. A simple test like urine albumin can be done at the health center level. As most of the patients had poor glycaemic control and long duration of diabetes, they might already develop the complications. We need to screen them regularly.

6. CONCLUSIONS

Based on the results of the study a few conclusions can be done :

- Majority of the diabetic patients were elderly, female, married, non-smoker, attained low education status and treated with oral hypoglycaemic agents.

- The diabetes control was poor as evidence of poor glycaemic control and high percentage of overweight and obese.

- The attitude of the patient on healthy life-style are better compare to their knowledge and practice.

- The structured healthy life-style program have a positive impact on HbA1c, BMI, knowledge and practice, but not on the RBS and attitude of the patients.

As an overall conclusion, although the result of the study are encouraging, we have noted some limitations and we look forward to a randomized study with repeated measurement that more definitively assess the the effect of health education program and sustained of healthy life-style.

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APPENDIX

Appendix 1

U S M

THE IMPACT OF STRUCTURED HEALTHY LIFE-STYLE PROGRAM AMONG TYPE 2 DIABETIC PATIENTS IN KELANTAN

MAIN RESEACHER :

Dr. Ab. Aziz al-Safi bin Ismail

OTHER RESEARCHERS :

1. Prof. Madya (Dr) Mafauzy Mohamad
2. Dr. Suhaiza Sulaiman

STUDY AREA :

GAAL DAN SELISING,
PASIR PUTEH, KELANTAN.

INSTITUTIONS INVOLVED :

USM, KKM

CHECK-LIST:

	YES	NO
1. Type 2 diabetic patient.	☐	☐
2. Aged more than 30 years.	☐	☐
3. Signed the consent form.	☐	☐
4. History of renal disease and on dialysis	☐	☐
5. Liver failure secondary to excessive alcohol intake, hepatitis or cirrhosis.	☐	☐
6. History of hospital admission after _____.	☐	☐
7. Diagnosed to have other chronic disease such as Tuberculosis or cancer.	☐	☐
8. proteinuria secondary to urinary tact infection, or used of drugs such as gentamycin, tetracycline, cisplatin, penicillamine or lithium.	☐	☐

CONSENT FORM

I'm , _____, identification number of _____, was given an explaination by _____ regarding the procedure of the study on THE IMPACT OF STRUCTURED HEALTHY LIFE-STYLE PROGRAM AMONR TYPE 2 DIABETIC PATIENTS IN KELANTAN, had understand the benefits and hazards of the study on myself.

With this, I 'm agree to participate the study.

Signature of the patients.

.....

I/C Number

.....

Date : .....

Signature of the researcher.

.....

I/C Number

.....

Date: .....

DIABETES QUESTIONNAIRE

NO:_____

A. DEMOGRAPHIC DATA

1. Registration number : [/ / / / / / / /]

2. Health Center : 1. Gaal HC
   2. Selising HC [ ]

3. Visiting date : [/ / / / / /]
   dd mm yy

4. Identification No. (old) : [/ / / / / / / / / / / /]
   (new) : [/ / / / / / / / /]

5. Age (year) : [/]

6. Gender :

   1. Male 2. Female [ ]

7. Marital Status :

   1. Single 2. Married 3. Divorced 4. Widow/er [ ]

8. Race :

   1. Malay 2. Chinese 3. Indian [ ]
   4. Siamese 5. Others

9. Education Status :

   1. No formal education
   2. Primary school
   3. Secondary school [ ]
   4. College / University

10. Occupation : [ ]
    1. Government staff
    2. Private sector

3. Odd job
4. Pensionner
5. Housewife

11. Total family income per month RM _____ [__]

11. Smoking status :
1. Current smoker 2. Ex-smoker 3. Non-smoker [__]

*** if ex-smoker, how long have you stop _____ year.**

B. MEDICAL HISTORY

1. Date of diagnosis of diabetes : [__/__/__/__]
mm yy

2. Duration of the diabetes : [__/__] year

3. Family history of diabetes

1. No 2. Yes [__]

If Yes, please clarify:
1. Mother
2. Father
3. Siblings
4. Others _____

4. Current treatment:
1. Diet only
2. Oral hypoglycaemic agent
3. Acarbose
4. Combination of 1,2 dan 3
5. Insulin
6. Insulin and oral treatment

5. Have you ever take an alternative medicine

1. No 2. Yes [__]

***If Yes, clarify the type and duration you have taken:**

_____

6. History of concomitant diseases.
    1. No
    2. Coronary artery disease
    3. Hypertension
    4. Stroke
    5. Others

THE QUESTIONNAIRE BELOW, FOR LADIES ONLY

7. Date of menarche [/ / /]
mm yy

8. Date of menopause [/ / /]
mm yy

9. Menopause symptoms that you have :
    0. No symptoms
    1. Hot flushing
    2. Emotional instability
    3. Headache
    4. Excessive sweat
    5. Joint pain
    6. Others.

10. Have you ever take 'Hormonal Replacement Therapy'

    1. No 1. Yes [ ]

If YES, please answer the questionnaire below, if NO, proceed to Part C.

10.1. Date of starting HRT [/ / /]
mm yy

10.2. Reason for taking HRT

1. Operation
2. Unable to tolerate the symptoms
3. Others.

C : QUESTIONNARE ON KNOWLEDGE, ATTITUDE AND PRACTICE ON HEALTHY LIFE-STYLE

1 . KNOWLEDGE

Y = Yes, T = No, TT = Uncertain

1. Regarding diabetes mellitus:
   - A. There is a sugar in the urine. ❑1.Y ❑2.T ❑3.T/T
   - B. Is cause by the failure of kidney to control the Sugar level in the urine. ❑1.Y ❑2.T ❑3.T/T
   - C. One of the risk factors is obese. ❑1.Y ❑2.T ❑3.T/T
   - D. Can cause blindness if not well control. ❑1.Y ❑2.T ❑3.T/T
   - E. Drugs is the only mode of treatment. ❑1.Y ❑2.T ❑3.T/T

2. Symptoms of diabetes include :
   - A. Frequent micturation ❑1.Y ❑2.T ❑3.T/T
   - B. Always thirst. ❑1.Y ❑2.T ❑3.T/T
   - C. Delay in healing of skin infection or ulcer. ❑1.Y ❑2.T ❑3.T/T
   - D. Weight loss inspite of good appetite. ❑1.Y ❑2.T ❑3.T/T
   - E. Easily fatigue and malaise. ❑1.Y ❑2.T ❑3.T/T

3. What is the mean of ideal body weight?
   - A. Body weight that is appropriate with the height. ❑1.Y ❑2.T ❑3.T/T
   - B. Body shape like a pear. ❑1.Y ❑2.T ❑3.T/T
   - C. Hip is smaller than waist. ❑1.Y ❑2.T ❑3.T/T
   - D. Waist is smaller than chest. ❑1.Y ❑2.T ❑3.T/T
   - E. Thin people. ❑1.Y ❑2.T ❑3.T/T

4. What are the mean of healthy diet?

A. High fibre diet.	❑1.Y	❑2.T	❑3.T/T
B. Low fat diet.	❑1.Y	❑2.T	❑3.T/T
C. Balanced diet.	❑1.Y	❑2.T	❑3.T/T
D. Delicious diet.	❑1.Y	❑2.T	❑3.T/T
E. Diet with high sugar content.	❑1.Y	❑2.T	❑3.T/T

5. The effects of exercise or physical activity include:

A. Can reduce the body weight.	❑1.Y	❑2.T	❑3.T/T
B. Can cause diabetes mellitus.	❑1.Y	❑2.T	❑3.T/T
C. Can control the blood glucose level.	❑1.Y	❑2.T	❑3.T/T
D. Can reduce the blood pressure.	❑1.Y	❑2.T	❑3.T/T
E. Can reduce the risk of developing the heart disease.	❑1.Y	❑2.T	❑3.T/T

2 : ATTITUDE

THE SCORE :
- ❑1 . Strongly not agree
- ❑2 . Not agree
- ❑3 . Uncertain
- ❑4 . Agree
- ❑5 . Strongly agree.

6. You should know your blood glucose level.	❑1	❑2	❑3	❑4	❑5
7. You have an ideal body weight.	❑1	❑2	❑3	❑4	❑5
8. You should maintain your ideal body weight.	❑1	❑2	❑3	❑4	❑5
9. You should take a variable and balanced diet in order to Maintain your health.	❑1	❑2	❑3	❑4	❑5
10. You should exercise to reduce the risk of diabetes mellitus	❑1	❑2	❑3	❑4	❑5

3 : PRACTICE

11. Do you know how much sugar you take everyday?. ❑1 Yes ❑2. No

12. Do you have an effort to prevent from eating too much? ❑1. Yes ❑2. No

13. Please clarify how your daily meals was prepare.

❑1. Never ❑2. Frequent ❑3. Always

A. Steam	❑1	❑2	❑3
B. Fried.	❑1	❑2	❑3
C. Baked	❑1	❑2	❑3
D. Soup	❑1	❑2	❑3
E. Oily soup	❑1	❑2	❑3
F. Used of coconut milk.	❑1	❑2	❑3

14. Do you have a regular exercise or physical activity ? ❑1. Yes ❑2. No

D. PHYSICAL EXAMINATION

1. Height (cm) [___._]
2. Weight (kg) [___._]
3. BMI [___._]
4. Waist circumference (cm) [___._]
5. Hip circumference (cm) [___._]

10. Blood pressure (mmHg)

A. Standing

1.____/____mmHg mean [___/___]
2. ____/____mmHg

B. Sitting

1.____/____mmHg mean [___/___]
2. ____/____mmHg

E . LABORATORY TEST

		dd mm yy	Result
1.RBS (mmol/l)	1.	[/ / / / /]	[.]
	2.	[/ / / / /]	[.]
2. Hb A1c (%)	1.	[/ / / / /]	[.]
	2.	[/ / / / /]	[.]

Appendix 2

USM

KAJIAN KESAN PROGRAM CARA HIDUP SIHAT YANG TERANCANG DI KALANGAN PESAKIT DIABETES DI KELANTAN

KETUA PENYELIDIK :

Dr. Ab. Aziz al-Safi bin Ismail

AHLI PENYELIDIK :

3. Prof. Madya (Dr) Mafauzy Mohamad
4. Dr. Suhaiza Sulaiman

KAWASAN KAJIAN :

GAAL DAN SELISING,
PASIR PUTEH, KELANTAN.

Institusi yang terlibat :

USM, KKM

PESAKIT : _____

ALAMAT : _____

NO. TELEFON: _____

SENARAI SEMAKAN:

	Ya	Tidak
10. Pesakit diabetes jenis 2.	☐	☐
11. Berumur lebih daripada 30 tahun.	☐	☐
12. Menandatangani borang kebenaran menjalankan kajian.	☐	☐
13. Mengidap penyakit buah pinggang dan menjalankan rawatan dialisis.	☐	☐
14. Mengalami kegagalan hepar di sebabkan oleh pengambilan alcohol berlebihan, hepatitis dan cirrhosis.	☐	☐
15. Dimasukkan ke hospital selepas _____.	☐	☐
16. Mempunyai lain-lain penyakit kronik seperti Tuberculosis dan kanser.	☐	☐
17. Mengalami proteinuruia disebabkan oleh infeksi saluran kencing atau penggunaan dadah seperti gentamycin, tetracycline, cisplatin, penicillamine dan lithium.	☐	☐

BORANG KEBENARAN KENJALANKAN KAJIAN

Adalah saya, ……, bernombor kad

pengenalan ……, pada hari ini telah diberi penerangan

oleh

…… berkenaan tatacara Kajian Kesan Program Cara Hidup Sihat yang Terancang di Kalangan Pesakit Diabetes, telah faham tentang faedah dan kesannya kepada diri saya.

Dengan ini saya telah bersetuju untuk turut serta di dalam kajian ini.

Tandatangan atau cap ibu jari kiri:

……

No. kad pengenalan:

……

Tarikh: ……

Tandatangan Penyelidik:

……

No. kad pengenalan:

……

Tarikh :……

BORANG SOAL SELIDIK PESAKIT DIABETES

NO:_____

C. DATA DEMOGRAFI

2. No Pendaftaran : [/ / / / / / / /]

2. Tempat rawatan : 1. K. K. Gaal
2. K. K. Selising [ ]

3. Tarikh lawatan : [/ / / / / /]
dd mm yy

4. No. Kad Pengenalan (baru) : [/ / / / / / / / / / / /]
(lama) : [/ / / / / / / / /]

5. Umur: (tahun) [/]

7. Jantina :

1. Lelaki 2. Perempuan [ ]

12. Taraf perkahwinan :

1. Bujang 2. Kahwin 3. Cerai 4. Balu [ ]

13. Bangsa :

1. Melayu 2. Cina 3. India [ ]
4. Siam 5. Lain-lain

14. Taraf pendidikan :

1.Tiada pendidikan formal
2.Sekolah rendah
3.Sekolah menengah [ ]
4.Kolej / Universiti

15. Pekerjaan : [ ]
6. Kerajaan
7. Swasta
8. Kerja sendiri

9. Pencen
10. Surirumah tangga

11. Jumlah pendapatan keluarga : RM _____ [__]

12. Adakah anda merokok :1. Tidak 2. Ya 3. Berhenti [__]

*** Jika berhenti, nyatakan berapa tahun** _____

D. RIWAYAT KESIHATAN

1. Tarikh diagnosa diabetes : [__/__/__]
mm yy

2. Tempoh penyakit diabetes: [__/__]tahun

4. Adakah ahli keluarga yang mengidap diabetes

1. Tidak 2. Ya [__]

Jika ya, nyatakan siapa:
5. Ibu
6. Bapa
7. Adik-beradik
8. Lain-lain; Nyatakan _____

4. Ubatan sekarang:
7. Diet sahaja
8. Ubat oral sahaja
9. Acarbose
10. Gabungan 1,2 dan 3
11. Insulin
12. Insulin dan ubatan oral

7. Adakah anda mengambil ubatan alternatif

1. Tidak 2. Ya [__]

***Jika Ya, nyatakan jenis dan tempoh anda megambilnya :**

_____

8. Adakah anda mengidap penyakit lain selain dari diabetes.
    6. Tidak
    7. Coronary artery disease
    8. Hypertension
    9. Stroke
    10. Lain-lain

SOALAN BERIKUT ADALAH BAGI PESAKIT WANITA SAHAJA

6. Tarikh menarche [/ / /]
mm yy

7. Tarikh menopause [/ / /]
mm yy

8. Apakah simptom/tanda-tanda menopause yang anda hadapi?
    7. Tiada
    8. Kepanasan (hot flushing)
    9. Ketidakstabilan emosi
    10. Sakit kepala
    11. Berpeluh
    12. Sakit sendi
    13. Lain-lain

9. Adakah anda mengamalkan 'Hormonal Replacement Therapy'

    0. Tidak 1. Ya [ ]

Jika Ya, jawab soalan dibawah, jika tidak, teruskan **kepada bahagian C.**

9.1. Tarikh mula ambil HRT [/ / /]
mm yy

9.2. Sebab mengambil HRT

    0. Operation
    1. Tidak dapat mengawal simptom
    2. Lain-lain.

C : SOAL SELIDIK BERKENAAN PENGETAHUAN, SIKAP DAN AMALAN DI KALANGAN PESAKIT DIABETES

1 . PENGETAHUAN

Y = Ya, T = Tidak, TT = Tidak tahu

6. Bagi orang yang mengidap kencing manis :

A. Terdapat banyak gula di dalam air kencing	❑1.Y	❑2.T	❑3.T/T
B. Disebabkan oleh kegagalan buah pinggang untuk mengawal gula didalam air kencing	❑1.Y	❑2.T	❑3.T/T
C. Diantara faktor risikonya adalah kegemukan	❑1.Y	❑2.T	❑3.T/T
D. Jika tidak di kawal akan menyebabkan buta	❑1.Y	❑2.T	❑3.T/T
E. Rawatannya adalah terdiri daripada ubat sahaja	❑1.Y	❑2.T	❑3.T/T

7. Di antara tanda-tanda atau gejala penyakit kencing manis adalah :

A. Kerap membuang air kecil	❑1.Y	❑2.T	❑3.T/T
B. Sentiasa berasa dahaga	❑1.Y	❑2.T	❑3.T/T
C. Luka atau kudis yang lambat sembuh	❑1.Y	❑2.T	❑3.T/T
D. Susut berat badan walaupun berselera makan	❑1.Y	❑2.T	❑3.T/T
E. Cepat berasa letih dan lesu	❑1.Y	❑2.T	❑3.T/T

8. Apakah yang dimaksudkan dengan berat badan yang sesuai?

A. Berat badan yang setimpal dengan ketinggian	❑1.Y	❑2.T	❑3.T/T
B. Bentuk badan seperti labu air	❑1.Y	❑2.T	❑3.T/T
C. Punggung lebih kecil daripada pinggang	❑1.Y	❑2.T	❑3.T/T
D. Pinggang lebih kecil daripada dada	❑1.Y	❑2.T	❑3.T/T
E. Badan yang kurus	❑1.Y	❑2.T	❑3.T/T

9. Apakah yang di maksudkan dengan makanan sihat?

A. Makanan yang banyak serat	❑1.Y	❑2.T	❑3.T/T
B. Makanan yang kurang lemak	❑1.Y	❑2.T	❑3.T/T
C. Makanan yang seimbang	❑1.Y	❑2.T	❑3.T/T
D. Makanan yang lazat dan sedap dimakan	❑1.Y	❑2.T	❑3.T/T

E. Makanan yang banyak gula ❑1.Y ❑2.T ❑3.T/T

10. Kesan senaman atau aktiviti fizikal adalah

A. Menurunkan berat badan	❑1.Y	❑2.T	❑3.T/T
B. Menyebabkan kencing manis	❑1.Y	❑2.T	❑3.T/T
C. Mengawal paras gula di dalam darah	❑1.Y	❑2.T	❑3.T/T
D. Menurunkan tekanan darah	❑1.Y	❑2.T	❑3.T/T
E. Mengurangkan risiko penyakit jantung	❑1.Y	❑2.T	❑3.T/T

2 : SIKAP

SKOR JAWAPAN :
❑1 . Sangat tidak setuju
❑2 . Tidak setuju
❑3 . Tidak pasti
❑4 . Setuju
❑5 . Sangat setuju

6. Anda perlu tahu paras gula di dalam darah anda.	❑1	❑2	❑3	❑4	❑5
7. Anda mempunyai berat badan yang yang sesuai?	❑1	❑2	❑3	❑4	❑5
8. Anda perlu menjaga berat badan yang sesuai?	❑1	❑2	❑3	❑4	❑5
9. Kita perlu mengambil makanan yang pelbagai dan seimbang bagi mengekalkan kesihatan yang baik.	❑1	❑2	❑3	❑4	❑5
10. Kita perlu bersenam untuk mengurangkan risiko penyakit kencing manis.	❑1	❑2	❑3	❑4	❑5

3 : AMALAN

11. Adakah anda tahu berapa banyak gula yang anda ambil setiap hari?
    ❑1 Tahu
    ❑2. Tidak Tahu

12. Adakah anda berusaha untuk menggelakkan dari makan terlalu banyak atau berlebihan? ❑1. Ya ❑2. Tidak

13. Nyatakan cara memasak / makanan utama seharian yang menjadi kegemaran anda.

    ❑1. Tidak pernah ❑2. Kadang kala ❑3. Kerap/sentiasa

A. Mengukus	❑1	❑2	❑3
B. Menggoreng	❑1	❑2	❑3
C. Memanggang	❑1	❑2	❑3
D. Merebus/menyinggang	❑1	❑2	❑3
E. Menumis	❑1	❑2	❑3
F. Memasak menggunakan santan	❑1	❑2	❑3

14. Adakah anda kerap bersenam atau melakukan aktiviti fizikal / riadah? ❑1. Ya ❑2. Tidak

D. PEMERIKSAAN FIZIKAL

1. Tinggi (cm) [___._]
2. Berat (kg) [___._]
3. BMI [___._]
4. Ukur lilit pinggang (cm) [___._]
5. Ukur lilit pinggul (cm) [___._]

11. Tekanan darah (mmHg)

A. Berdiri

1.____/____mmHg mean [___/___]
2. ____/____mmHg

B. Duduk

1.____/____mmHg mean [___/___]
2. ____/____mmHg

E . UJIAN MAKMAL

		dd mm yy	Keputusan
1.RBS (mmol/l)	1.	[/ / / / /]	[.]
	2.	[/ / / / /]	[.]
2. Hb A1c (%)	1.	[/ / / / /]	[.]
	2.	[/ / / / /]	[.]

OBESITY AMONG TYPE 2 DIABETIC PATIENTS IN KELANTAN

*Suhaiza S., Aziz A.S.I.**

ABSTRACT

A non-randomized control trial among type 2 diabetic patients was conducted in Pasir Puteh, Kelantan from June 2000 until May 2001 with the aim to provide a healthy life –style program for the patients. This paper will present the baseline data of this intervention study. One hundred and fourty type 2 diabetic patients, aged above 35 year old were selected using the multistage sampling technique. Questionnaire, anthropometric measurement and blood sampling were used in collecting the data. Data entry and analysis was done by SPSS version 9.0 statistical program. Majority of patients were female (61.4%), attained low education status (25.4 % no formal education, 42.1% attained up to primary school) and married (78.1%). The mean age was 55.8 ±10.95 year. The mean body mass index (BMI) was 26.1 ± 4.15 kg/m^2 and 55.5% of patients have BMI > 25 kg/m^2. Associations between gender, level of education and marital status with the BMI were noted to be not statistically significant. There was no correlation between age, HbA1c level and duration of diabetes with the BMI. The study showed that the prevalence of overweight and obesity among type 2 diabetic patients were high (55.5%). A structured healthy life style program which consist of health education, dietary advise and exercise program will be instituted for the patients. It is hope that the prevalence of overweight and obesity will be reduced after the program.

Key words : Type 2 diabetes, obesity, overweight, body mass index.

ABSTRAK

Satu kajian "non randomized control trial" di kalangan pesakit diabetes jenis 2 telah dilakukan di Daerah Pasir Puteh, Kelantan dari Jun 2000 hingga Mei 2001 dengan tujuan untuk menghasilkan satu program cara hidup sihat di kalangan pesakit diabetes. Kertas kajian ini akan mempamerkan data-data awal sebelum program intervensi dijalankan. Seratus empat puloh pesakit diabetes jenis 2, berumur 35 tahun ke atas telah dipilih secara persampelan berperingkat. Soal selidik, pengukuran antropometri dan persampelan darah telah dilakukan bagi mendapatkan data. Program "Statistical Program for Social Science version 9.0" telah digunakan untuk menganalisis data. Majoriti pesakit adalah perempuan(61.4%), bertaraf pendidikan rendah(25.4% tiada pendidikan formal, 42.1% sekolah rendah) dan berkahwin (78.1%). Purata umur adalah 55.8 ± 10.95 tahun. Purata index jisim

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badan (BMI) adalah 26.1 ± 4.15 kg/m^2 dan 55.5% mempunyai BMI > 25.0 kg/m^2. Hubungan antara jantina, taraf pendidikan dan taraf perkahwinan dengan BMI adalah tidak signifikan secara statistik (p > 0.05). Umur, paras HbA1c dan jangkamasa diabetes juga didapati tidak mempunyai korelasi yang signifikan dengan BMI (p>0.05). Kajian ini menunjukkan prevalens berat badan berlebihan dan obesiti adalah tinggi di kalangan pesakit diabetes jenis 2 (55.5%). Satu program cara hidup sihat yang merangkumi pendidikan kesihatan, nasihat pemakanan dan program senaman akan dirangka kepada pesakit ini. Adalah diharapkan prevalens berat badan berlebihan dan obesiti dapat diturunkan setelah program ini dijalankan.

Kata kunci: Diabetes jenis 2, obesiti, kelebihan berat badan, index jisim badan.

INTRODUCTION

Diabetes mellitus has become a common condition world wide especially in the developed and developing country. The prevalence of this disease has been significantly increased. Diabetes has become one of the most common chronic diseases in US (Maureen IH *et al.*, 2000). Whereas the prevalence of hypertension and hypercholesterolemia and the incidence of and mortality from heart disease and stroke are markedly decline in US (Sytkowski PA *et al.*, 1990; Govern MC PG *et al.*, 1993), the prevalence of diabetes is growing. In Malaysia, the similar trend has been reported, in 1996 the prevalence of diabetes was about 8.3% (National Health Morbidity Survey, 1997), increased from 0.65% in 1960 and 2.1% in 1982 (Mustaffa BE, 1990).

Obesity is found to be strongly associated with type 2 diabetes, causally or perhaps sharing common etiological factors in susceptible individuals (Lean MEJ *et al.*, 1990). Weight gain was associated with substantially increased risk of diabetes among overweight adult, and even modest weight loss was associated significantly reduced diabetes risk (Resnick HE *et al.*, 2000). The problem of obesity has drawn much concern as it has reached epidemic proportions, affecting adults and children in both developed and developing countries. In USA, 54% of adult are overweight (body mass index (BMI) $\geq$ 25.0 – 29.9 kg/m^2) and 22% are obese (BMI $\geq$ 30.0 kg/m^2) (Geok LK *et al.*, 1999). Based on similar BMI cut-off point, the National Health and National Morbidity Survey of Malaysia reported the prevalence overweight and obesity as 16.6% and 4.4% respectively (Geok LK *et al.*, 1999). A retrospective study suggested that weight loss is associated with reduced long-term mortality in patients with type 2 diabetic, and there is evidence that weight loss with diet, exercise and behavioural therapy will improve the glycaemic control (Wilding J, 2000). Among diabetes, obesity was associated with uncontrolled glycaemic level, which was secondary to insulin resistance (Ruzita AT *et al.*, 1996). An unhealthy life-style such as lack of physical activity, stress and overeating worsen the metabolic control of type 2 diabetic patients. Thus, the aim of this study was to provide a structural healthy life-style program for the diabetic patients and if it is successful, it can be apply to the community. This paper will report the first phase of the study, that is the baseline data.

PATIENTS AND METHODS

This is a non-randomized control trial, which is conducted from June 2000 till May 2001. Subjects were selected by using multistage sampling technique with Kelantan as the reference population and randomized to the district and later to the health centre. Selising Health Centre (HC) will present as the intervention group and Gaal HC as the control group. Seventy patients from each health centre were selected into the study based on the inclusion and exclusion criteria. The inclusion criteria were all type 2 diabetes, aged more than 30 years and consented, whereas the exclusion criteria were patient with renal disease on dialysis, lever failure secondary to alcohol abuse, hepatitis or cirrhosis, history of acute illness or hospitalization within one month prior to the study period. Patients were individually interviewed by structured questionnaire about their socio-demographic data and medical history. Body weight and height were taken and the subjects were weighted barefooted and with light clothing on. The venous blood was taken using the aseptic technique. The blood was analyzed in Hospital Universiti Sains Malaysia biochemistry and endocrine laboratory. Random blood sugar was analyzed with the enzymatic glucose oxidase (GOD) method (Trinder· P, 1969) and HbA1c using the cation exchange liquid chromatography (low pressure) method (BIO-RAD, 1998). Data analysis was done with the help of Statistical Package for the Social Science (SPSS) version 9.0 (Norusis MJ, 1993). The differences between the two BMI groups (BMI < 25 kg/m^2 and BMI ≥ 25 kg/m^2) was analyzed with Multiple Logistic Regression and the differences between the two health centre with the independent t-test. The study was approved by USM and Ministry of Health ethics committee.

RESULTS

During the four months period of study (June – September 2000), 140 patients with type 2 diabetes were selected, which were 70 from each health center. Detailed socio-demographic distributions are shown in table 1. Majorities of our patients are female, Malay, married, attained low education status and had no history of smoking.

Detailed characteristics of the disease are shown in the table 2. About 40% of the patients had other medical illness and have family history of diabetes. Half of them had history of taking alternative medicine. The patients in both health center had a similar characteristics based on age, duration of illness, BMI, HbA1c and random blood sugar level.

The BMI status of the patients is shown in the table 3. Fifty five percent of them are either overweight or obese.

Smoking status was found to have a significant association with the BMI (Table 4). Other variables such as age, duration of illness, HbA1c level, gender and education status were not statistically significant.

DISCUSSION

Our study showed that the prevalence of overweight and obesity among type 2 diabetic patients was high (Table 3). More than half of the patients has BMI $\geq$ 25 kg/m^2. The mean BMI was 26.1 $\pm$ 4.15 kg/m^2 that is above the acceptable value. The Malaysian diabetic population also showed the similar results, where the mean BMI was 25.9 $\pm$ 6.00 kg/m^2 and 52 % of them had BMI $\geq$ 25 kg/m^2 (Rokiah P, 1998). Army who are the active group has higher prevalence compare to our study, where 68.7% of the diabetic army had BMI $\geq$ 25 kg/m^2 (Maznorela M, 1998). The mean age of our patients was 55.8 $\pm$ 10.95 year which is almost similar to the diabetic population in Malaysia that is 56.4 $\pm$ 12.7 year (Rokiah P, 1998). Majorities of the patient are Malays that reflex the Kelantan population, married, female and attained low education status (Table 1). The different characteristic of patients were found in Singapore where diabetes is more commoner in males and Indian (Cheah JS et al., 1982). This condition can be explained by the difference of the socio-demographic factors among the two population.

About 30% of the patients had history of smoking. Similar prevalence was reported among the Malaysian diabetic patients (Rokiah P, 1998). These percentage were lower compared to the percentage of diabetic patients with history of smoking in Liverpool that is 70% (Ismail AI, 1998). The lower prevalence in our population can be explained by the difference method of assessing the smoking status between the two population. In our study, we are using the interview method where the patients may give a wrong information. Whereas in Liverpool, they are measuring the breath carbon monoxide and urinary for the assessment of smoking status which was more objective compare to our methods cotinine (Ardron M et al., 1988; Aziz AI et al., 1997 ; MacFarlane IA,1991).

Regarding medical history of the patients, the mean duration of illness was 5.4 $\pm$ 4.69 year, 40% of the patient had other concomitant disease and 43.9% of them had positive family history of similar illness (Table 2). Compare to Malaysian population (Rokiah P,1998), our patients had shorter duration of illness. Another study done in Southern Taiwan , showed that the percentage of having concomitant disease and family history of disease is lower compare to our population (Feng HL et al. 1998).

About 7.9% of our patient was on diet control alone, which was higher compare to Malaysian population that is 2.9% (Chan SP, 1998). Nearly half of the patient had history of taking alternative medicine, which reflex the Kelantan population who had a strong belief on alternative medicine.

The results also shown that majority of the patients had poor glycaemic control with the mean HbA1c level of 9.9 $\pm$ 2.77% (Table 2), which was above the acceptable value (Ministry of Health & Malaysian Diabetes Association. 1996). Similar condition was noted in the Malaysian diabetic patients that is 9.1% (Chan SP,1998). The socio-demographic and medical status of the patients had no significant influenced in the BMI level except the smoking status (Table 4).

The socio-demographic and characteristic of the patients are similar in both health centre. The Selising HC was presented as the intervention group and Gaal HC as the control group. The intervention group will be given a dietary advised by the

dietician, health education on management and knowledge of diabetes by the community medicine specialist and exercise program by the trained instructor. The control group will have a conventional health education given by the medical and health officer and medical assistant. The post-intervention evaluation will be done by February 2001. We hope there is a significant difference of the result between pre and post-intervention program.

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ACKNOWLEDGEMENT

This study was supported by grant from the Universiti Sains Malaysia, Penang. We would like to thank the staff of Gaal and Selising Health Center who helps in the study.

Table 1: Socio-demographic distribution of the patients (N = 140 patients)

Characteristic of the patients		Value
Mean age (year)		55.8 ± 10.95
Male : Female		54 : 86
Race:	Malay	99.1%
	Others	0.91%
Education status:	No formal education	25.4%
	Primary school	42.1%
	Secondary school	30.7%
	College/University	1.8%
Smoking status:	Non-smoker	68.1%
	Current smoker	15.9%
	Ex-smoker	15.9%

Table 2: Characteristic of the patients.

Item		Value
Mean duration of illness (year)		5.4 ± 4.69
Concomitant disease :	Coronary artery disease	4.4%
	Hypertension	28.3%
	Stroke	1.8%
	Others	5.3%
	No other disease	60.2%
Family history of similar illness (Yes : No)		61 : 79
Type of treatment:	Diet alone	7.9%
	Oral hypoglycaemic agent	92.1%
History of taking alternative medicine (Yes : No)		64 : 76
Mean body mass index (kg/m^2)		26.1 ± 4.15
Mean random blood sugar (mmol/l)		13.2 ± 6.86
Mean HbA1c (%)		9.9 ± 2.77
Mean systolic blood pressure (mm/Hg)		146.9 ± 21.69
Mean diastolic blood pressure (mm/Hg)		91.5 ± 12.03

Table 3: Body Mass index (BMI) status

BMI (kg/m^2)	Value
< 24.9	62 (44.5%)
25.0 - 29.9	56 (39.8%)
≥ 30.0	22 (15.7%)
Total	140 (100%)

Table 4 : Difference between the BMI <25 Kg/m^2 and BMI ≥ 25kg/m^2

Item	BMI < 25 kg/m^2	BMI > 25 kg/m^2	p value
N (%)	62 (44.5%)	78 (55.5%)	
Age (year)	56.5 ± 10.86	55.6 ± 10.89	NS
Duration of illness (year)	5.6 ± 5.08	5.2 ± 4.46	NS
HbA1c (%)	10.3 ± 2.91	9.6 ± 2.69	NS
Male : Female (%)	28 : 34	26 : 52	NS
Smoking (%) (NS:ES:CS)	35 : 17 : 10	60 : 6 : 12	0.02
Education status (%) (NF:PS:SS:C/U)	20 : 28 : 13 : 1	15 : 31 : 31 : 1	NS

Note

NS = Non-smoker ; CS = Current smoker ; ES = Ex-smoker ; NF = No formal education PS = Primary school ; SS = Secondary school ; C/U = College or university

GLYCAEMIC CONTROL AMONG TYPE 2 DIABETIC PATIENTS IN KELANTAN

Suhaiza, S., Abdul Aziz al-Safi, I. *

ABSTRACT

A cross sectional study was conducted to determine the level of glycaemic control among type 2 diabetic patients in Kelantan. One hundred and fourty type 2 diabetic patients from Selising Health Center and Gaal Health Center, Pasir Puteh District were selected into the study by using the multistage sampling technique. Data were collected through the questionnaire, anthropometric measurement and blood sampling. Statistical Package for the Social Science (SPSS) version 9.0 was used for analyzing the data. Majority of patients was Malay (99.1%), female (61.4%) and married (78.1%). The education level was low (25.4% no formal education, 42.1%up to primary school). The mean age was 55.8 ± 10.93 year and the mean BMI was 26.1 ± 4.22kg/m^2. The mean HbA1c was high (9.9 ± 2.82%), and 85.7% have poor glycaemic control (HbA1c > 7.5%). Gender, educational level, age, income, body mass index and duration of diabetes had no significant influence on the glycaemic control (p > 0.05). The study showed majority of type 2 diabetic patients had poor glycaemic control and we should review why these patients were managed at primary care level. Also it is important to have a structured healthy life style program which consist of health education, dietary advise and exercise program in helping the patients to improve their glycaemic control.

Key Words: Type 2 diabetes, glycaemic control, HbA1c.

ABSTRAK

Satu kajian irisan lintang telah dilakukan bagi menentukan paras kawalan gula dalam darah di kalangan pesakit diabetes jenis 2 di Kelantan. Seratus empat puloh pesakit dari Pusat Kesihatan Selising dan Pusat Kesihatan Gaal, di daerah Pasir Puteh telah dipilih secara persampelan berperingkat untuk menyertai kajian ini. Data dikumpul melalui borang soal selidik, pengukuran antropometri dan pengambilan sampel darah. "Statistical Package for the Social Science version 9.0" telah digunakan untuk menganalisa data. Majoriti pasakit adalah Melayu(99.1%), perempuan(61.4%) dan berkahwin(78.1%). Taraf pendidikan adalah rendah(25.4% tiada pendidikan formal, 42.1% sehingga sekolah rendah). Purata umur adalah 55.8 ± 10.93 tahun dan purata jisim indeks badan adalah 26.1±4.22kg/m^2. Purata HbA1c adalah tinggi (9.9± 2.82%), di mana 85.7% mempunyai paras kawalan yang tidak memuaskan (HbA1c > 7.0%).

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Jantina, taraf pendidikan, umur, pendapatan, index jisim badan dan jangkamasa diabetes tidak mempunyai pengaruh yang signifikan ke atas paras kawalan gula ($p > 0.05$). Kajian menunjukkan majoriti pesakit mempunyai paras kawalan gula dalam darah yang tidak memuaskan, adalah perlu untuk dikaji mengapakah pesakit-pesakit ini masih dirawat di pusat-pusat kesihatan. Satu program cara hidup sihat yang merangkumi pendidikan kesihatan, nasihat pemakanan dan program senaman juga perlu dirangka bagi membantu pesakit-pesakit ini.

Kata Kunci: Diabetes Jenis 2, kawalan gula, HbA1c.

INTRODUCTION

Diabetes mellitus is a particular emerging health problem worldwide. The prevalence varies widely in different region, but observation showed a significant increased in prevalence of this chronic disease. In Malaysia, the prevalence in 1996 was about 8.3% (National Health Morbidity Survey, 1997), increased from 0.65% in 1960 and 2.1% in 1982 (Mustaffa BE, 1990). Similar trends were observed in developed countries such as United States. The prevalence for United States was about 0.4% in 1930, increased to 2.4% in 1978 and 3.1% in 1994 (Satcher D, 1999). Between 1980 and 1994, the number of person with diagnosed diabetes in United States increased by 2.2 million, an increase of 39% (Satcher D, 1999). The increased prevalence probably related to increased of aging population, lifestyle and dietary changes and improvement of diagnostic test. The facts about diabetes mellitus leave no doubt about it seriousness. The seventh leading cause of death in the United States, diabetes contributes to more than 193,000 deaths each year (Satcher D, 1999). All of these patients are at risk of developing diabetic complication. In Malaysia, the prevalence of chronic complications is high, retinopathy is 53%, neuropathy is 58%, amputations is 2 %, legal blindness is 1%, myocardial infarction is 9%, stroke is 6% and renal failure 1% (Mustaffa BE, 1998).

For the economic burden, diabetes is a costly condition by virtue of its high prevalence and high per person cost (Selby JV *et al.*, 1997). A large proportion of these costs is related to treating complications of diabetes. Annual costs of providing care were 2.4 times greater for diabetics members than for nondiabetic group with the same age, sex, and zip code distribution.

Tight control of blood glucose and blood pressure has been shown recently in the United Kingdom Prospective Diabetes Study (UKPDS), to reduce the risk of developing macrovascular and microvascular complications (Turner R, 1996). Therefore, the only course for diabetes at present is to ensure perfect control of their diabetes status so that the complications may be prevented or delayed. According to the Diabetes Control and Complication Trial research group, under careful treatment condition, patient under going intensive diabetes management do not face deterioration in the quality of their life (The Diabetes Control and Trial Research Group, 1996). In Malaysia, an audit on diabetes care was done in a hospital to assess the effectiveness of the diabetes management (Lim TO, 1990). Results revealed that

diabetes patient received less than adequate care. Only 9% of patient achieved good glycaemic control; 39% had hypertriglyceridaemia and 65% had undesirable weight gain while on treatment. Therefore, this study was conducted with the aim of assessing the level of diabetic control among our population and later we need to develop a structured program in helping these patients.

METHODOLOGY

A cross sectional study was conducted from June till September 2000. Multistage sampling technique was used for selection of study area, with Kelantan as a reference population, then randomized into the district level and later into the health center level. At last Selising and Gaal Health Center (HC) were selected for the study area. A hundred and fourty patients (70 patients from each HC) were selected based on inclusion and exclusion criteria. . The inclusion criteria were all type 2 diabetes, aged more than 30 years and consented, whereas the exclusion criteria were patient with renal disease on dialysis, lever failure secondary to alcohol abuse, hepatitis or cirrhosis, history of acute illness and admission one month prior to the study period or patient who are treated in both health center. Patients were individually interviewed by structured questionnaire about their socio-demographic data and medical history. Body weight and height were taken and the subjects were weighted barefooted and with light clothing on. The venous blood was taken using the aseptic technique. The blood was analyzed in Hospital Universiti Sains Malaysia biochemistry and endocrine laboratory. Random blood sugar was analyzed with the enzymatic glucose oxidase (GOD) method (Trinder P, 1969) and HbA1c using the cation exchange liquid chromatography (low pressure) method (BIO-RAD, 1998). For the purpose of this study, good glycaemic control was defined as HbA1c level $\leq$ 7% and poor glycaemic control if the HbA1c level of more than 7%. Data analysis was done with the help of Statistical Package for the Social Science (SPSS) version 9.0 (Norusis MJ, 1993). The multiple logistic regression was used to compare the mean and proportion difference between the two group of glycaemic control. A p value of < 0.05 was taken as being statistically significant. The study was approved by USM and Ministry of Health ethics committee.

RESULTS

A hundred and fourty patients were selected into the study with 70 patients from each health center.

Socio-demographic distribution

Table 1 summarized the socio-demographic distribution of the patients. Majority of them was female, Malays, married and attain low education status. The mean age was 55.8 ± 10.93 year. About 30% of them had history of smoking either current or ex-smoker.

Table 1: Socio-demographic Distribution

(N = 140 patients)

Characteristic of the patients		Value
Mean age (year)		55.8 ± 10.93
Female (%)		61.4
Marital status :	Single	0.9 %
	Married	78.1 %
	Divorced	4.4 %
	Widow/er	16.7 %
Education status :	No formal education	25.4 %
	Primary school	42.1 %
	Secondary school	30.7 %
	College / university	1.8 %
Smoking status : Non-smoker		68.1 %
	Ex-smoker	15.9 %
	Current smoker	15.9 %
Mean duration of illness (year)		5.4 ± 4.74
Mean Systolic blood pressure (mmHg)		146.9 ± 21.72
MeanDiastolic blood pressure (mm/Hg)		91.5 ± 12.04
Mean body mass index (kg/m^2)		26.1 ± 4.22
Mean random blood sugar (mmol/l)		13.3 ± 6.9
Mean HbA1c level (%)		9.9 ± 2.82

Characteristic of the patients

The characteristics of the patients were summarized in the table 1. The mean duration of illness was 5.4 ± 4.74 year. The mean blood pressure and body mass index were 146.9 / 95 mmHg and 26.1 kg/m^2 respectively.

Diabetic control

HbA1c level reflects the diabetes status over a period of 2-3 months (Ruzita AT *et all,*. 1996). The mean HbA1c level was 9.9 ± 2.82% (Table 1) and 85.7% of the patients have HbA1c level above 7.0% (Table 2).

Difference the good and poor glycaemic control

There was no significant difference of mean age, duration of illness and body mass index (BMI) level between the group (Table 2). HbA1c level also was not significantly influenced by the gender, smoking status and marital status.

Table 2: Comparison between the control and uncontrolled patients

Item	HbA1c ≤ 7.0%	HbA1c > 7.0%	p value
N (%)	20 (14.3%)	120 (85.7%)	
Age (year)	55.8 ± 11.21	56.1 ± 10.80	NS
Duration of illness (year)	4.0 ± 3.52	5.6 ± 4.84	NS
BMI (kg/m^2)	26.6 ± 2.73	26.1 ± 4.45	NS
Male : Female (%)	55 : 45	36.7 : 63.3	NS
Smoking status (NS:CS:ES)	81.2 : 6.2 : 12.6	66.4 : 16.8 : 16.8	NS
Marital status (S:M:D:W)	5 : 90 : 0 : 5	0 : 77.5 : 4.2 : 18.3	NS

Note:
NS = Non-smoker, CS = Current smoker, ES = Ex-smoker, S = Single,
M = Married, D = Divorced, W = Widow/er

DISCUSSION

The study shows that our patients were still have a poor glycaemic control. The mean HbA1c was above the acceptable value (Table1) and 85.7% of them had a poor glycaemic control (Table 2). This result was similar to the Malaysian diabetic population, where the mean HbA1c was 9.1% (Chan SP, 1998). Although the result of these study was obtained from a different type of data, they still produce almost the same result. For the Malaysian diabetic population the result was obtained from the secondary data, whereas in our study the result was from the primary data which was more accurate. However, the type 2 diabetic patients in urban Malaysia have a better glycaemic control with the mean HbA1c level of 7.7 ± 3.00% (Ruzita AT *et al.*,1996). This condition occur probably due to the patients in urban area have a better knowledge about the nature, symptoms, complications and treatment of diabetes compare to our population which was in the rural area.

Even though obesity is the most common factor for prediction of diabetic control, our study shows that there was no significant association between diabetes control and level of BMI (Table 2). This condition may not reflect the real scenario in the community as this is a cross sectional study, which have a substantially weaker power to dissect the association between the variables (Laakso *et al.*, 1996). Other variable such as age, duration of illness, gender, marital status, education status and smoking status also shows the similar results (Table 2).

The most important things, our study shows that these patients were at risk of developing diabetic complications. The mean age of the patients was 55.8 ± 10.93 years. The prevalence of the complications of diabetes, especially those of macrovascular origin, increased with age (Morgan CL *et al.*, 2000). This trend was parallel to, but chronologically advanced from trends in non-diabetic patients. Apart

from age, duration of diabetes, which is in part of age-related, may represent a more sensitive predictor of diabetes related morbidity. Previous study had indicate clearly that, for diabetic specific complications (retinopathy and nephropathy), duration of diabetes is a strong predictor, irrespective the type of diabetes (Morgan CL *et al.*, 2000). Other than above factors, glycaemic control is the most important predictor of diabetic complications. Patients with intensive therapy (HbA1c $\leq$ 7.0 %) may reduce the risk of developing diabetes-related death by 10%, any diabetes-related end point by 12% and all cause of mortality by 6% compare to the patients with conventional therapy (HbA1c > 7.0%) (United Kingdom Prospective Diabetes Study group. 1998). The mean complication-free time interval was 1.3 years longer in the intensive group compare to conventional group. Apart from complication, an intensive therapy group also experienced a better quality- of- life compare to the conventional therapy group (The Diabetes Control and Complications Trial Group. 1996). The Wisconsin Epidemiologic Study of Diabetes Retinopathy (WESDR) also found that the glycated haemoglobin level was strongly related to the incidence or progression or both of diabetic retinopathy, gross proteinuria and loss of tactile sensation or temperature sensitivity in person with either Type 1 or Type 2 diabetes (Klein R *et al.*, 1996).

As a conclusions, the diabetes control among our population was poor (85.7% with HbA1c level > 7.0%; mean HbA1c level of 9.9 $\pm$ 2.82%) and the patients were at risk of developing the diabetes complications (mean age : 55.8 $\pm$ 10.93 year, mean duration of illness : 5.4 $\pm$ 4.74 year and mean HbA1c : 9.9 $\pm$ 2.82%). A structured healthy life-style program need to be provide for the patients. This program should include health education regarding nature, management, complications and diabetes dietary control. Important of exercise in controlling diabetes also should be emphasized. By doing this program, we hope the diabetic control will be better and the diabetic complications can be prevent or delay.

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ACKNOWLEDGEMENT

This study was supported by grant from the Universiti Sains Malaysia, Penang. We would like to thank the staff of Gaal and Selising Health Center who helps in the study.

Increased in CVD risk in post-menopausal type 2 diabetic women in Kelantan – A case for hormone replacement therapy

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We have conducted a cross sectional study to explore cardio vascular disease (CVD) risk factors in a group of type 2 diabetic patients. Patients were interviewed using structured questionnaire, weight and height were measured and blood sample were taken. A total of 140 were enrolled in the study, aged > 30 years (87 women, 53 men) with a mean (SD) age of 55 (11) years and diabetes duration of 6(4) years. There were significant differences between the female and male in the HbA1c levels (10.2 ± 2.9 vs.9.1 ± 2.3%, $p < 0.05$) and the smoking prevalence (7.6% vs. 66.7%, $p<0.05$). However there were no significant differences in the prevalence of hypertension (34% vs. 25%, $p>0.05$), body mass index (BMI) (26.9 ± 4.7 vs. 25.8 ± 3.24, $p>0.05$), and angina (3.8% vs. 4.2%, $p > 0.05$). Fifty two women (60%) were menopause. Major coronary risk factors in particular hypertension (37% vs. 26%, $p>0.05$), angina (6.0% vs. 3.0%, $p > 0.05$) and HbA1c (10.5 ± 3.1 vs.9.8 ± 2.6%, $p > 0.05$) were adverse in post-menopausal women, however they were not significant. Body mass index, as well as smoking prevalence were equal in both groups. Twenty five percent of post menopausal women experience symptoms, ranging from headache (3%) to emotional instability (10%) and hot flushing (12%). However, none except one on HRT. Our results show that post-menopausal female type 2 diabetic patients have higher degree of coronary risk factors. As nearly all of them were not on any form of replacement therapy, HRT might be of benefit in decreasing the CVD risk in these women.

[Kelantan Health Conference, Perdana Resort, Kota Bharu 4 –5 November 2001]